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APPENDIX

Supreme Court, U. S.
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IN THE

Supreme Court of the United States

OCTOBER TERM, 1975

No. 75-

NORTHERN INDIANA PUBLIC SERVICE COMPANY,
Petitioner,

v.

PORTER COUNTY CHAPTER OF THE IZAAK WALTON LEAGUE OF AMERICA, INC.; CONCERNED CITIZENS AGAINST BAILLY NUCLEAR SITE; BUSINESSMEN FOR THE PUBLIC INTEREST, INC.; JAMES E. NEWMAN, ET AL., *Respondents*

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Seventh Circuit

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UNITED STATES COURT OF APPEALS
FOR THE SEVENTH CIRCUIT
Chicago, Illinois 60604

April 1, 1975

Opinion by Judge Sprecher
Judge Tone dissenting

BEFORE
Hon. THOMAS E. FAIRCHILD, *Chief Judge*
Hon. ROBERT A. SPRECHER, *Circuit Judge*
Hon. PHILIP W. TONE, *Circuit Judge*

No. 74-1751

PORTER COUNTY CHAPTER OF THE IZAAK WALTON LEAGUE OF AMERICA, INC., ET AL.,
Petitioners,

and

THE PEOPLE OF THE STATE OF ILLINOIS, ETC.,
Petitioners-Intervenors,

v.

THE ATOMIC ENERGY COMMISSION AND USA,
Respondents,

and

NORTHERN INDIANA PUBLIC SERVICE COMPANY,
Respondent-Intervenor.

Petition for Review of Final Orders of the Atomic Energy Commission

This cause came on to be heard on the transcript of the record from the Atomic Energy Commission and was argued by counsel.

On consideration whereof, it is ordered and adjudged by this Court that the decision of the Atomic Energy Commission entered in this cause on August 29, 1974 is unlawful and the same is hereby set aside, in accordance with the opinion of this Court filed this date.

In the

United States Court of Appeals

For the Seventh Circuit

No. 74-1751

PORTER COUNTY CHAPTER OF THE IZAAK WALTON LEAGUE OF AMERICA, INC.; CONCERNED CITIZENS AGAINST BAILLY NUCLEAR SITE; BUSINESSMEN FOR THE PUBLIC INTEREST, INC.; JAMES E. NEWMAN; MILDRED WARNER and GEORGE HANKS,

Petitioners,

and

THE PEOPLE OF THE STATE OF ILLINOIS, ex rel. WILLIAM J. SCOTT, Attorney General of the State of Illinois,

Petitioners-Intervenors,

v.

THE ATOMIC ENERGY COMMISSION and THE UNITED STATES OF AMERICA,

Respondents,

and

NORTHERN INDIANA PUBLIC SERVICE COMPANY,

Respondent-Intervenor.

Petition for Review of Final Orders of the Atomic Energy Commission

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ARGUED DECEMBER 11, 1974 — DECIDED APRIL 1, 1975

Before FAIRCHILD, *Chief Judge*, SPRECHER and TONE, *Circuit Judges.*

SPRECHER, *Circuit Judge.* This appeal involves the sensitive issue of whether the Atomic Energy Commission in approving the site of a commercial nuclear reactor gave due consideration to the population density and use characteristics of the site environs.

I

On August 24, 1970, Northern Indiana Public Service Company (NIPSCO) submitted its application for a construction permit and operating license for a 685 megawatt boiling water nuclear power plant to be built on the applicant's Bailly site on the southern shore of Lake Michigan, Westchester Township, Porter County, Indiana.

Under the Atomic Energy Act of 1954 as amended, 42 U.S.C. §§ 2011-2282, each application for a commercial license under section 2133, which must include a Preliminary Safety Analysis Report (PSAR) pursuant to 10 C.F.R. § 50.34(a), is reviewed by the staff of the Atomic Energy Commission (AEC) through the Division of Reactor Licensing (DRL) pursuant to 10 C.F.R. §§ 1.120 and 2.102(a), and by the 15-member Advisory Committee on Reactor Safeguards (ACRS) pursuant to 42 U.S.C. §§ 2039 and 2232(b).

In this case after the filing of 16 amendments by NIPSCO, ACRS filed its safety report on October 14, 1971, pursuant to 42 U.S.C. § 2232(b) and 10 C.F.R. § 2.102(c) and the AEC staff through DRL filed its Safety Evaluation Report (SER) on February 15, 1972. A general notice of hearing on the application for a construction permit dated December 21, 1971, had been published by AEC on December 29, 1971 in 36 Fed. Reg. 25175 (1971).

An Atomic Safety and Licensing Board (ASLB) of three members was constituted on January 12, 1972, pursuant to 42 U.S.C. § 2241 and at a prehearing conference held on May 9, 1972, at Valparaiso, Indiana, admitted as Joint Intervenors the following: Porter County Chapter of Izaak Walton League of America, Inc.; Concerned Citizens Against the Bailly Nuclear Site;

Businessmen for the Public Interest, Inc.; and James E. Newman, Edward W. Osann, Jr., Mildred Warner and George Hanks. Bethlehem Steel Corporation was also admitted as a party intervenor.

Because of other commitments, members of the original ASLB were unable to continue to serve and a Notice of Reconstitution of Board was issued on June 20, 1972. The reestablished ASLB conducted the evidentiary hearing.

In the meantime, NIPSCO had submitted an environmental report on January 7, 1971, which was amended three times. In July 1972, AEC issued a draft environmental statement and in February 1973, a Final Environmental Statement (FES).

ASLB held evidentiary hearings for 65 days on October 10-13, 1972 at Gary, Indiana, and between April 30 and November 14, 1973, at Valparaiso, Indiana. Oral arguments on proposed findings were held on February 19, 1974.[1]

The Initial Decision of ASLB authorizing the issuance of a construction permit was entered on April 5, 1974, and reported in Regulatory Adjudication Issuances of AEC. *NIPSCO*, LBP-74-19, RAI-74-4, 557 (April 5, 1974).

The Joint Intervenors appealed the Initial Decision, which was affirmed by the Atomic Safety and Licensing Appeal Board consisting of three members (ASLAB), pursuant to 10 C.F.R. § 2.785(a), on August 29, 1974. *NIPSCO*, ALAB-224, RAI-74-8, 244 (Aug. 29, 1974). Unless the AEC undertakes *sua sponte* a review of an

[1] In addition, prehearing conferences with all parties in attendance were held on May 9, 1972, at Valparaiso, Indiana; on September 6, 1972, at Hammond, Indiana; on November 1, 1972, at Schiller Park, Illinois; and on March 9, 1973, at Washington, D.C.

ASLAB decision pursuant to 10 C.F.R. § 2.786, that decision becomes the final decision of the AEC, 10 C.F.R. §§ 2.770 and 2.785(a).[2] Thereafter any final decision is subject to judicial review in the court of appeals, 42 U.S.C. § 2239(b) and 28 U.S.C. § 2342(4), where the petitioner resides or has its principal office or in the Court of Appeals for the District of Columbia Circuit, 28 U.S.C. § 2343.

On September 13, 1974, the Joint Intervenors petitioned this court to review the August 29, 1974 order of ASLAB authorizing the issuance to NIPSCO of the construction permit and the September 5, 1974 order of ASLAB denying Joint Intervenors' motion for remand for further proceedings to consider NIPSCO's alleged participation in the proposed building of another nuclear plant in the early 1980's near Madison, Indiana. *NIPSCO*, ALAB-227, RAI-74-9, 416 (Sept. 5, 1974).

By orders of this court of September 20, October 3, and November 8, 1974, NIPSCO, the State of Illinois and the City of Gary, Indiana, were admitted as intervenors. On September 18, Joint Intervenors[3] moved in this court for a stay pending appeal and on October 4, the government moved for leave to reopen the administrative proceedings for further hearing on NIPSCO's proposal to construct a slurry wall at the site.

On October 16, 1974, we ordered (1) that the AEC order of August 29 be stayed pending review of that decision; (2) that AEC be permitted to reopen its administrative proceedings for further hearings upon the

[2] The Energy Reorganization Act of 1974, Pub. L. No. 93-438, 88 Stat. 1233 (Oct. 11, 1974), replaces AEC with an independent regulatory commission known as the Nuclear Regulatory Commission (NRC). NRC is authorized to delegate its licensing and regulation of nuclear reactors to its Office of Nuclear Reaction Regulation under the supervision of a director. *Id.* § 203.

[3] "Joint Invervenors" will hereafter continue to refer to the original intervenors, not including Bethlehem Steel Corporation. The intervenors in this court will be referred to as NIPSCO, Illinois and Gary.

environmental impact of the building of a slurry wall; (3) that any action by AEC permitting the construction of a slurry wall be stayed pending further order of this court after AEC has rendered a final decision concerning the slurry wall; and (4) that an expedited briefing schedule be followed.

On November 15, 1974, the Joint Intervenors moved this court for clarification of the October 16 order to determine whether that order required NIPSCO to fill in the existing excavation on the site as well as to cease any further site dewatering. On November 18, that motion was ordered taken with the case at the time of oral argument on December 11, 1974.

The arguments on appeal made by Joint Intervenors, Illinois and Gary are multi-faceted but all revolve ultimately upon whether AEC gave due consideration to the population density and use characteristics of the site environs.

II

The proposed site for locating this commercial nuclear reactor is unique in many respects. The site is a reverse L-shaped 350-acre tract of land in Porter County, Indiana, on the south shore of Lake Michigan. The shorter base of the L runs from Lake Michigan to the south and constitutes the 107-acre tract on which the nuclear plant is sought to be located. The longer leg of the reverse L runs at a right angle from the southern end of the base from west to east and contains the remaining approximately 250 acres.

The reverse L-shaped nuclear site abuts the western boundary and the southern boundary of the western portion of the Indiana Dunes National Lakeshore, an irregularly shaped area that stretches some eleven miles along the south shore of Lake Michigan directly east of the 107-acre portion of the reactor site.

In 1966 Congress authorized the Secretary of the Interior to establish the Indiana Dunes National Lakeshore "[i]n order to preserve for the educational, inspirational, and recreational use of the public certain portions of the Indiana Dunes and other acres of scenic, scientific, and historic interest and recreational value. . . ." 16 U.S.C. § 460u.

On September 20, 1972, the National Park Service published a notice stating that "there has been acquired within the boundaries of the Indiana Dunes National Lakeshore an acreage which is efficiently administrable for the purposes of said Act and, therefore the Lake Shore is hereby established." 37 Fed. Reg. 19389 (1972). The National Lakeshore has thus far acquired 8300 acres or 85 percent of the land authorized by Congress to be acquired. Interspread within but not a part of the National Lakeshore acreage are the towns of Dune Acres and Beverly Shores and the Indiana Dunes State Park, which consists of an additional 2,200 acres and occupies approximately three of the eleven miles of beach shore.

Most of the 8300 acres is open dune and wetland. The ASLB found and concluded:

> The location of the proposed facility on the shore of Lake Michigan to the north and bounded on the east by the Indiana Dunes National Lakeshore is characterized by its proximity to an environment of special qualities.
>
> The Indiana Dunes region includes an exceptional combination of sand dunes, marshes, swamps and bogs, white sand beaches, and diversified flora and fauna—a natural area difficult to equal anywhere in the Nation. That portion of the Indiana Dunes National Lakeshore adjacent to the Bailly site and consisting of some 1200 acres is one of the best remaining areas in the Indiana Dunes. Starting at the edge of Lake Michigan and proceeding inland, it contains a cross-section including a wide beach of largely quartz sand, a low foredune covered by sparse vegetation; higher dunes, some active and sparsely covered and others having trees and other vegetation, rising from 25 to almost 200 feet above Lake level in a complex of blowouts, ridges, valleys,

> and interdunal ponds. This cross-section exemplifies terrestrial plant succession on dune sand as described by Cowles over 70 years ago. The dynamic nature of the Indiana Dunes has attracted scientists as an ideal outdoor laboratory to study the principles of ecological succession. . . .
>
> On the south of the dune complex, and to the north of the ancient shoreline of the Calumet stage of Lake Michigan . . . is a unique wetland area known as Cowles Bog which contains an undrained pond or depression filled with water and largely covered by a relatively thick mat of vegetation. The fact that the Department of Interior's National Park Service has designated a sizeable portion of these unique natural settings abutting the proposed plant site as a Class IV Land namely "an outstanding natural area of special significance for public edification" . . . has weighed heavily in the Board's consideration of the potential impact of the proposed plant on its surroundings.

NIPSCO, LBP-74-19, *supra* at 586-87 (Finding 103).[4]

On the 107-acre site where the plant is sought to be located, NIPSCO operates two coal-fired electrical generating stations and a gas turbine peaking plant. The proposed nuclear facility would be built west of the three existing plants. On the west and south sides of the proposed site, Bethlehem Steel Corporation operates a steel plant employing some 7,500 employees. To the west of the Bethlehem plant is the proposed Port of Indiana.

In fact the area south and west of the site is a "vast industrial and urban complex [within which] are five major cities—Gary, Hammond, East Chicago, Whiting [all

[4] Similarly, the ASLAB said:

> The Lakeshore . . . encompasses beaches, sand dunes, marshes and bogs and is generally dedicated to public recreational purposes. Some of its features, the dune ridges and Cowles Bog National Landmark in particular, are undoubtedly unique.

NIPSCO, ALAB-224, *supra* at 257.

in Indiana] and Chicago, [Illinois] and numerous municipalities intermeshed . . . [within which] almost 7 million people live." (Joint Intervenors' Ex. 23).

The downtown Chicago loop area is about 30 miles from the site. Downtown Gary is about 12 miles and the eastern boundary of Gary is 5.25 miles from the proposed reactor building.

The cumulative population density data in the record shows actual and projected population at various distances from the Bailly site (October 1973 Stipulation; Staff Ex. 12) as follows:

Distance from Bailly	Population	
	1970	1985
0—5 miles	20,432	29,793
0—20 miles	600,000	700,000
0—30 miles	2,276,579	2,502,531
0—40 miles	5,000,000	6,000,000

III

In enacting the Atomic Energy Act of 1954, Congress found that the regulation of the facilities used in connection with the production and utilization of atomic energy was necessary, among other purposes, "to protect the health and safety of the public." 42 U.S.C. § 2012(e). Another purpose was to provide "a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public." 42 U.S.C. § 2013(d).

"[N]o license [for a utilization or production facility] may be issued to any person within the United States if, in the opinion of the Commission, the issuance of a license to such person would be inimical to the common defense and security or to the health and safety of the public." 42 U.S.C. § 2133(d).

Finally, in connection with the applications for licenses to operate facilities, the applicant shall furnish such information "as the Commission may, by rule or regulation, deem necessary in order to enable it to find that the utilization or production of special nuclear material will be in accord with the common defense and security and will provide adequate protection to the health and safety of the public." 42 U.S.C. § 2232(a).

In evaluating the proposed site for a nuclear reactor the AEC has promulgated regulations which provide that it "will take . . . into consideration" three factors:

> (1) Characteristics of reactor design and proposed operation;
>
> * * *
>
> (2) Population density and use characteristics of the site environs, including the exclusion area, low population zone and population center distance; and
>
> (3) Physical characteristics of the site, including seismology, meteorology, geology and hydrology.

10 C.F.R. § 100.10.

Population density and use characteristics are further defined in 10 C.F.R. § 100.11. A license applicant is directed to assume (a) a fission product release from the core, (b) the expected demonstrable leak rate from the containment and (c) the meteorological conditions pertinent to his site, in order to derive the three area or population buffer zones of (1) exclusion area, (2) low population zone and (3) population center distance. The size or area of the first two buffer zones is determined by calculating that certain maximum radiation dosages, for stated periods after an accident, to an individual located on the outer boundaries of each zone not be exceeded. The third zone is one and one-third times the distance from the reactor to the outer boundary of the second zone.[5]

NIPSCO in its brief before us has emphasized the complexity of determining the first two buffer zones "because each of the principal elements . . . (fission product release, containment leak rate, meteorological conditions) depends upon the applicant's proposed reactor plant design and site," making "no single formula" possible. (Br. at 10-11). The regulations, and the record herein insofar as it pertains to NIPSCO's attempt to comply with them, confirm the complex nature of determining the critical factor of "population density and use characteristics of the site environs" in regard at least to the first two buffer zones. Because of the complexity of that determination, which necessarily subsumes the expertise of the AEC in reaching definitive

[5] 10 C.F.R. § 100.11 provides in part:

> (a) As an aid in evaluating a proposed site, an applicant should assume a fission product release from the core, the expected demonstrable leak rate from the containment and the meteorological conditions pertinent to his site to derive an exclusion area, a low population zone and population center distance. For the purpose of this analysis, which shall set forth the basis for the numerical values used, the applicant should determine the following:
>
> (1) An exclusion area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated fission product release would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure.
>
> (2) A low population zone of such size that an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure.
>
> (3) A population center distance of at least one and one-third times the distance from the reactor to the outer boundary of the low population zone. In applying this guide due consideration should be given to the population distribution within the population center.

conclusions, we turn first to the problem of determining the third buffer zone, the solution of which is relatively simple and merely involves a mathematical computation and the interpretation of non-technical language, an area where no expertise beyond normal adjudication is required. *See* 4 K. DAVIS, ADMINISTRATIVE LAW TREATISE § 30.09 (1958 ed. and 1970 Supp.).

10 C.F.R. § 100.11(a)(3) describes the third buffer zone as:

> A population center distance of at least one and one-third times the distance from the reactor to the outer boundary of the low population zone.

10 C.F.R. § 100.3(c) adds:

> "Population center distance" means the distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents.

The ASLB approved NIPSCO's and the AEC Regulatory Staff's calculations of the radii of the three population buffer zones as follows:

(1) Exclusion Area: 188 meters or .1168 mile. *NIPSCO*, LBP-74-19, *supra* at 561, 563 (Findings 14, 19);

(2) Low Population Zone: 2413 meters or 1.5 miles. *Id.* at 561, 563, 565 (Findings 14, 19, 24);

(3) Population Center Distance: 3219 meters or 2 miles. *Id.* at 565 (Finding 24).

As stated earlier, Findings (1) and (2) are based on radiation dosage calculations but (3) is simply 1⅓ times (2).

In accordance with these findings, the application of the 10 C.F.R. 100 regulations would require that no "densely populated center containing more than about 25,000 residents" be located at or nearer than two miles from the reactor.

The City of Portage, Indiana, had a population of 19,127 in 1970 but the ASLB found that "[u]pon questioning concerning the City of Portage, the Staff acknowledged the expected population of Portage by 1980 would exceed 25,000." *NIPSCO*, LBP-74-19, *supra* at 565 (Finding 24). Without so finding, ASLB referred to evidence that "the nearest boundary [of Portage] was 1.1 miles from the reactor site." *Id.* The briefs of both the government and NIPSCO accept the fact that the political or municipal or corporate boundary of Portage is approximately one mile from the reactor.[6]

Inasmuch as the site evaluation factors are promulgated to insure the safety of the adjoining population,[7] "[a]t the very least, consideration should . . . be given to the best available estimates as to what will be the population in the general vicinity of the reactor during the early years of actual operation."[8] The evidence

[6] In discussing Joint Intervenor's contentions, the government states that "the *political boundary* of the City of Portage . . . was only one mile away," (Br. at 35) and NIPSCO states that "[Portage's] nearest municipal boundary is within 1.1 miles of the site." (Br. at 24).

[7] 10 C.F.R. § 100.10 provides that "the site location and the engineered features included as safeguards against the hazardous consequences of an accident, should one occur, should insure a low risk of public exposure."

[8] *Southern California Edison Co.*, ALAB-248, RAI-74-12, 957, 960 (Dec. 24, 1974), where the ASLAB also said in regard to the San Onofre Nuclear Generating Station, Units 2 and 3:

> Part 100 does not specify the precise time at which the number of persons within a potential population center is to be measured. But, the purpose of the Part 100 criteria being to ascertain whether a particular site is suitable for reactor operation, it would make little sense to look only at the size of the population as of the time of the construction permit proceeding (several years prior to reactor operation).
>
> [T]here is a strong likelihood that, sometime during the first few years of reactor operation (if not before), San Clemente will have a population of "more than about 25,000." Therefore, we see no reason why San Clemente should not be treated as the closest population center, and we accordingly do so.

Id. at 959-60. *See also Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, RAI-73-10, 831, 848 (Oct. 26, 1973).

here is uncontroverted that the population of Portage will grow to 25,000 between 1976 and 1977 and to about 29,000 in 1980, the early years of expected operation of this reactor.

The ASLB and eventually the ASLAB accepted the Regulatory Staff's argument that the political boundary of Portage was to be ignored and instead some amorphous, flexible and movable center or centroid of population was to be considered. The fatal error in this alleged logic is that AEC itself has defined "population center distance" as the distance from the reactor "to the *nearest boundary* of a densely populated center containing more than about 25,000 residents." 10 C.F.R. § 100.3(c) (emphasis added). NIPSCO's own witness conceded that "the centroid itself doesn't have a boundary; it is a point."

Section 100.11(a)(3) also adds:

> In applying this guide, due consideration should be given to the population distribution within the population center.

But giving such due consideration to population distribution does not eliminate the need to establish a boundary. Recently the ASLAB in another case found that the city limits of San Clemente, with an estimated future population likely to exceed 25,000, was within the population center distance and required a recalculation of radiation dosage distances.[9] We agree with AEC's ASLAB in that case, that a densely populated center may extend beyond the political or corporate limits of the 25,000 population unit, but there is neither reason

[9] *Southern California Edison Co.* (San Onofre Station), ALAB-248, RAI-74-12, 957, 957-61 (Dec. 24, 1974). In a footnote, the ASLAB added:

> The "nearest boundary of a densely populated center" will not necessarily coincide with city or other political limits, for densely populated areas *may extend beyond such limits*. In this case, a portion of the dividing line between [Orange and San Diego] counties does also represent *the extreme southeastern limits* of San Clemente.

Id. at 960 n.7 (emphasis added).

nor sound safety policy to cut down the boundaries of that unit and make some hopeless attempt to construct imaginary boundaries.

The ASLB in this case recognized the fallacy of substituting centroids for boundaries[10] and found as follows:

> To initially determine the heavily populated portion of the population center, the Staff used official Geological Survey (USGS) maps . . . on which densely populated areas are depicted in pink.

NIPSCO, LBP-74-19, *supra* at 565 (Finding 25).

The map relied upon for the "pink" sections (thus having boundaries) is the United States Department of the Interior geological survey of the Portage quadrangle. The map is "revised from aerial photographs taken 1967" and "field checked 1968." It must be kept in mind that the principal portion of the hearings in this case took place in 1973, at least five years later. The map purports to show individual dwellings as dots but the "pink," or what the map refers to as "red tint," simply indicates areas where individual dwellings are not shown. The map itself makes no representations or even references to population. The map clearly indicates the "corporate boundary of Portage" as being about one mile from the reactor.

In the critical determination of the "Population Center Distance," it would be ludicrous to attempt to reduce the political boundaries of the population center by such

[10] The Board said that it "was particularly concerned with intervenors claim that the Applicant had erred in choosing Gary as the nearest population center, that indeed Portage would be the proper choice and that the nearest boundary was 1.1 miles from the reactor site." *NIPSCO*, LBP-74-19, *supra* at 565 (Finding 24).

Member Walter H. Jordan of the ASLB said during the evidentiary hearings (Oct. 11, 1972 Tr. 613):

> [M]y reading of Part 100 does not say distance to the center; it says distance to the population center, but it does not mean the center of the population center in making that calculation. It is the environs of that population center, I believe.

vague and indefinite references. Presumably, the cartographers could have tinted any part of the Portage quadrangle pink inasmuch as they indicated no guidelines which they used in selecting the areas so tinted.

Here the corporate boundary of Portage was about one mile from the reactor and the evidence showed that the boundary of census enumeration district 719 of Portage as well as the boundary of the enumeration district representing the entire City of Portage were both less than a mile from the reactor. Since both the ASLB and ASLAB found that the boundary of a densely populated center containing more than about 25,000 residents must be at least two miles away from the reactor, their conclusion that a construction permit be granted cannot stand.

This conclusion does not take into consideration the additional fact that the boundaries of each of the communities of Dune Acres, Porter and Burns Harbor are also less than two miles from the reactor and that their total population, when included with that of Portage and unincorporated county areas within two miles, of course, exceeds 25,000.

Nor does this conclusion take into consideration the fact, discussed in greater detail later, that the master plan for the Indiana Dunes National Lakeshore contemplates that "[a]ctive use of all of the facilities provided for in this plan, both in the State Park and in the Lakeshore, will permit a maximum visitation of about 87,000 persons a day." (Joint Intervenors' Ex. 23). Presumably, a large portion of such visitors would or could come within the two-mile limit of the third buffer zone, but such a conclusion is not necessary because the AEC siting regulations have been violated in this case on the basis of Portage alone.

It is also important to consider that Bethlehem Steel Corporation's 7,500 employees are located at about one mile from the Bailly site.

IV

In view of the vast consequences of shutting off or delaying a potential source of considerable energy in these times of energy crisis, together with the effect of such an occurrence upon the economic, financial and industrial well-being and development of northern Indiana, obviously we cannot finally act without giving very serious consideration to every possible factor which may conceivably bear upon the problem.

The factors in favor of granting the permit are so pervasive and weighty that they are impossible to ignore. Northern Indiana, as the entire country, has a need for additional generating power, employment and economic assistance. Witness after witness made so-called "limited appearance statements," appearing on their own behalf or on behalf of a group or organization or utility or union, requesting that a construction permit be issued in order to provide additional energy, jobs or stimuli to the economy. It is pertinent to note, however, that almost every witness in one fashion or another conditioned his request upon either his hope or confidence that AEC would adequately protect the public safety and, in some cases, also protect the environment.

In fact these circumstances militating in favor of the permit are so overwhelming that perhaps the AEC in a completely well-intentioned and good faith effort to accomplish ends which everyone seeks to accomplish has tended to become somewhat lax in assuring that the means employed thereby function in as safe a manner as possible so that one day we do not come to regret the proliferation of nuclear power.

Judge Oakes of the Second Circuit Court of Appeals recently noted in a dissent his concern "that the AEC is charged with the dual duty of passing on licenses on the one hand but promoting the use of atomic power on the other." *Morningside Renewal Council, Inc. v. AEC*, 482

F.2d 234, 240-41 (2d Cir. 1973), *cert. denied*, 417 U.S. 951 (1974).[11]

Presumably, this observation has been largely invalidated by the Energy Reorganization Act of 1974 which purports to divide the promotional and research aspects of atomic energy, to be administered by the Energy Research and Development Administration (ERDA), from the licensing and regulatory functions, to be administered by the Nuclear Regulatory Commission (NRC). Nevertheless, the orders which we are presently reviewing occurred under the old AEC procedure and the merging of the diverse functions thereunder may explain to a certain extent some of the factors which we next consider.

A

AEC appears to have given no direct consideration to the clustering of nuclear power plants around the southern end of Lake Michigan within relatively short distances from the density of population of metropolitan Chicago.

Although there appears to be no likelihood of a chain-reaction effect which would lead an accident from one plant to another, recent developments indicate that plants built within a contemporary time period tend to

[11] "AEC is supposed to stimulate the use of atomic energy and at the same time enforce the conditions of use imposed by its own regulations. There is sound basis for the argument that the two roles are incompatible." C. ALLARDICE & E. TRAPNELL, THE ATOMIC ENERGY COMMISSION 123 (1974). *See also Carolina Environmental Study Group v. AEC*, *slip op.* No. 73-1869 at 9 (D.C. Cir., Jan. 21, 1975), where the court said: "The possibility of such a conflict of interests is obvious."

For case and commentator documentation of "whether the regulatory agency is unduly oriented toward the interests of the industry it is designed to regulate, rather than the public interest it is designed to protect," see Mr. Justice Douglas' dissent in *Sierra Club v. Morton*, 405 U.S. 727, 745-48 (1972).

develop structural deficiencies at or about the same time.[12]

There are presently eight nuclear power plants within about 75 miles of downtown Chicago[13] and six more are in the planning stage.[14] The Bailly Generating Station, Nuclear-1, as this plant has been designated, would be the fifteenth plant clustered around metropolitan Chicago.

The AEC siting regulations as they pertain to the population center distance, discussed *supra* in Part III, provide in part:

> Where very large cities are involved, a greater distance may be necessary because of total integrated population dose consideration.

10 C.F.R. § 100.11(a)(3).

This distance referred to, in the circumstances of the present case, is, of course, two miles, but the regulations indicate AEC's awareness that consideration must be given to "very large cities" such as Chicago.

In what the ASLAB called "the draft of an internal staff working paper pertaining to allowable levels of

[12] In September 1974, the Dresden 2 plant at Morris, Illinois, developed a leak in a 4-inch bypass pipe in its emergency core cooling system. Inspections revealed cracks or preliminary indications of cracks in the same pipe in eight boiling water reactors in the United States and Japan. Recently, the NRC closed 23 plants for inspection when five small cracks were discovered in 10-inch cooling pipes at Dresden 2. N.Y. Times, Feb. 6, 1975 at 24, col. 1.

[13] About 30 miles away are Zion 1 and Zion 2 at Zion, Illinois (completed in 1972); about 50 miles away are Dresden 1 (1960), Dresden 2 (1970) and Dresden 3 (1972) at Morris, Illinois, and Donald C. Cook 1 (1973) and Donald C. Cook 2 (1974) at Bridgman, Michigan; somewhat further is Palisades (1971) at South Haven, Michigan. ALLERDICE & TRAPNELL, *supra* note 11, at 224-25.

[14] About 50 miles away will be Braidwood 1 (1980) and Braidwood 2 (1981) at Braidwood, Illinois; somewhat further will be LaSalle 1 (1977) and LaSalle 2 (1978) at Seneca, Illinois, and Byron 1 (1979) and Byron 2 (1980) at Byron, Illinois. ALLERDICE & TRAPNELL, *supra* note 11, at 224-25.

population density around nuclear plant sites" (*NIPSCO*, ALAB-224, *supra* at 252), AEC's staff noted as of April 17, 1973:

> A long-standing policy of the Atomic Energy Commission[15] has encouraged siting of nuclear plants away from densely populated areas until additional operating experience has been obtained.[16]

When the AEC made the staff working paper public on April 9, 1974, the AEC press release accompanying the paper virtually repeated one year later that:

> Under a policy established by the AEC in 1962, the siting of nuclear power plants at some distance from densely populated areas has not been encouraged until additional operating experience has been obtained.

AEC Press Release, T-160 at 2 (April 9, 1974).

In *Power Reactor Development Co. v. International Union of Electrical Workers*, 367 U.S. 396 (1961), the Supreme Court reversed the court of appeals which had set aside an AEC order issuing a construction permit, saying:

> The Court of Appeals put forward as an alternative basis for its decision the holding that under the law the Commission may not authorize the construction of a reactor near a large population center [35 miles from the center of Detroit and 30 miles from the center of Toledo] without "compelling reasons" for doing so, . . . 280 F.2d at 651-652, and that no such reasons had been found by the AEC in this case. . . . [T]he position is without merit. The

[15] The staff footnote at this point referred to Statement of Consideration, Reactor Site Criteria, 10 C.F.R. Part 100, 27 Fed. Reg. 3509 (1962).

[16] AEC REGULATORY STAFF WORKING PAPER, POPULATION DISTRIBUTION AROUND NUCLEAR POWER PLANT SITES, Appendix A (April 17, 1973, released April 9, 1974). The staff paper also observed: "There has been no reason to take the additional incremental risk, however small, of incurring doses to a large metropolitan population as a result of any accident in the nuclear facility when other suitable sites, less densely populated, remain available." *Id.* at 1.

> statute and regulations say nothing about "compelling reasons." Of course Congress (and the Commission, too, for that matter) had the problem of safety uppermost in mind, and of course that problem is most acute when a reactor, potentially dangerous, is located near a large city. But the Commission found reasonable assurance, for present purposes, that the reactor could be safely operated at the present location, and that is enough to satisfy the requirements of law.

Id. at 414.[17]

In the *Power Reactor* case, the majority had disposed of "the fears of nuclear disaster" by pointing out that the issuance of the construction permit was only the first step, and that the applicant would be required to satisfy safety-of-operations requirements prior to obtaining an operating permit. In 1962, however, Congress amended the Atomic Energy Act of 1954 to eliminate the two-hearing requirement in effect at the time of the decision of *Power Reactor*. The mandatory hearing is now required only prior to the issuance of the construction permit. *Union of Concerned Scientists v. AEC*, 499 F.2d 1069, 1074-80 (D.C. Cir. 1974). It is now unquestionably true as Mr. Justice Douglas said in his dissent in *Power Reactor* that "the time when the issue of 'safety' must be resolved is before the Commission issues a construction permit." 367 U.S. at 419.

The Senate Report accompanying the Energy Reorganization Act of 1974, included the following observations:[18]

> Most commercial reactors now use a low-enriched uranium fuel that is not suitable for manufacture of

[17] In a dissent concurred in by Mr. Justice Black, Mr. Justice Douglas said:

> The construction given the Act by the Commission (and today approved) is, with all deference, a light-hearted approach to the most awesome, the most deadly, the most dangerous process that man has ever conceived.

367 U.S. at 419.

[18] S. REP. No. 93-980, 93d Cong., 2d Sess., U.S. CODE, CONG. & ADMIN. NEWS 4868, 4869 n.1 (1974).

> bombs. They all produce plutonium as a by-product, however, which after reprocessing is potentially explosive and suitable for bombs. . . . At present, there are about 1 million pounds of plutonium and enriched uranium authorized in the licensed sector, about half of it of weapons grade. Plutonium, in addition to its potential explosiveness, is one of the most toxic substances known to man. One thirty-millionth of an ounce, less than a pollen grain will cause cancer if inhaled or swallowed.[19]

Despite these factors, the AEC gave no direct consideration to the effect of the existence of from eight to fifteen nuclear plants clustered around the Chicago metropolitan population.

B

Not only did the AEC disregard what at least some of its expert staff deemed important population considerations, but it also disregarded its own past course of conduct in approving nuclear power sites.

The 1973 Working Paper prepared by the AEC Regulatory Staff (*supra*, note 16) analyzed all sites which up to that time (April 1973) had been given consideration for licensing, and listed each one together with both its maximum Site Population Factor (SPF)[20]

[19] In 1974, according to NRC, the nuclear power industry experienced more than 1,400 "abnormal" events, four of which had a "directly significant" bearing on nuclear safety and radiation control. Chicago Sun-Times, Feb. 14, 1975 at 18, col. 1.

[20] [A] weighting of the incremental populations around a reactor at the annular distances of 1, 2, 3, 4, 5, 10, 20, 30, 40 and 50 miles in comparison to a hypothetical site having a uniform population distribution of 1,000 people per square mile.

The weighting factors applied to the populations at the various annular distances are inversely proportional to the distance from the source. The inverse weighting is in consonance with the increased atmospheric dilution with distance for an assumed release of radioactivity emanating from a reactor. According to the weighting, a given population close to the site would be considered to present a higher risk than the same population farther away. The weighting used is the distance (d) raised to the -1.5 power.

STAFF WORKING PAPER, *supra* note 16 at B-9.

and the SPF at 50 miles. Sixty-eight proposed and actual sites are listed and Bailly, which is 30 miles from downtown Chicago, has the sixth highest SPF at 50 miles. The five sites with a higher SPF at that distance according to rank were: (1) Ravenswood, (2) Indian Point, (3) Newbold Island, (4) Limerick and (5) Zion.

Ravenswood was withdrawn as a proposed site because of population considerations.[21] In October 1973, the AEC informed the applicant utility that Newbold Island was not suitable because of population density. Because of the high population density at Limerick, the AEC staff issued special safety evaluations. With regard to high population density sites the staff stated:

> Indian Point and Zion are the highest population density sites which have received construction permits.

STAFF WORKING PAPER, *supra* note 16 at B-5.

> At the present time the staff uses an informal guideline that sites with a population density greater than that of an envelope of the Zion, Newbold Island and Indian Point site populations are not considered acceptable.

Id. at 1.

The Bailly site is closer to downtown Chicago than the Zion site.

Furthermore, if the granting of a construction permit to Bailly was allowed to stand, Bailly would achieve the dubious distinction of being nestled within one of the top few most dense population areas of all 68 sites proposed

[21] Another site, Burlington, which had a lower population figure at 50 miles but greater overall than Bailly, was also withdrawn because of population considerations.

thus far in the United States for siting nuclear power plants.[22]

C

In September 1974, the AEC issued its DRAFT REGULATORY GUIDE 4.7, GENERAL SITE SUITABILITY CRITERIA FOR NUCLEAR POWER STATIONS (Sept. 1974),[23] which included the following:

> Sites adjacent to some lands devoted to public use may be considered unsuitable. In particular, the use of some sites . . . close to special areas administered by Federal, State, or local agencies for scenic or recreational use may cause unacceptable impacts regardless of design parameters. Such cases are most apt to arise in areas adjacent to natural-resource oriented areas (e.g., Yellowstone National Park) as opposed to recreation-oriented areas (e.g., Lake Mead National Recreation Area).[24] Some historical and archeological sites may also fall into this category. The acceptability of sites near special areas of public use should be determined by consulting cognizant government agencies.

Id. at 14.

The agency which the AEC specifically indicates "should be consulted" in regard to a National Lakeshore is the National Park Service of the United States Department of the Interior. Congress has delegated its authority over the public lands of the Indiana Dunes National Lakeshore to the Secretary of the Interior. 16 U.S.C. §§ 460u-460u-9.

In response to the draft environmental statement, the Deputy Assistant Secretary of the Interior wrote on October 19, 1972:

> We must conclude that the construction of the proposed Bailly Generating Station Nuclear-1 on the border of the Indiana Dunes National Lakeshore does not serve the highest public interest. Therefore, we recommend that the Atomic Energy Commission withhold the issuance of a construction license . . . at this site. . . .

Nathaniel Reed, the Assistant Secretary of the Interior testified before the ASLB and after establishing a host of impacts which the adjoining Bailly plant would have on the National Lakeshore, the following occurred:

> Chairman . . .: So, therefore, you are—the Department is completely against the Bailly site irrevocably?
>
> The Witness: Yes, I think that's an accurate statement.

---

[22] The 1973 Working Paper also states that when population density is high

> [T]he Regulatory Staff will request: (1) an analysis of alternative sites including a showing that the proposed high population density site offers significant advantages from the standpoint of environmental, economic or other factors; and (2) the inclusion of state-of-the-art engineered safety features to assure that the overall risk to the public has been minimized.

STAFF WORKING PAPER, *supra* note 16 at A-1.

In regard to the Bailly site "[the Regulatory Staff's] conclusion was that when only environmental matters were considered, the Bailly site was superior but not overwhelmingly so." The ASLB "agrees with this conclusion." *NIPSCO*, LBP-74-19, *supra* at 624.

[23] The Regulatory Guide states that it is "not [a] substitute . . . for regulations and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission." DRAFT REGULATORY GUIDE, *supra* at 1.

[24] The poet Carl Sandburg is reported to have said:

> The Indiana Dunes are to the Midwest what Yosemite is to California, Grand Canyon is to Arizona. They are a signature of time and eternity. Once lost, their loss would be irrevocable.

Chicago Sun-Times, Dec. 8, 1974 (Magazine), at 15.

Draft Regulatory Guide 4.7 continues:

> It should be recognized that some as yet undesignated areas may be unsuitable for siting because of public interest in future dedication to public scenic, recreational, or cultural use. Relatively rare land types such as sand dunes and wetlands are prime candidates for such future designation.

DRAFT REGULATORY GUIDE, *supra* at 14.

The ASLAB in this case found:

> The unique features of the Indiana Dunes and wetlands have long been recognized by conservation-minded individuals.

NIPSCO, ALAB-224, *supra* at 262.

To summarize, dunes and wetlands are prime candidates for future designation as public recreational sites, and if adjacent, or near to a proposed nuclear site it is rendered unsuitable. Yet long-recognized valuable natural areas which have already been designated as recreational sites and which abut hard against a proposed nuclear site are deemed suitable. And although consultation with cognizant government agencies is intended to determine the acceptability of such sites, when the Department of the Interior upon consultation is "completely against the site irrevocably," that site is accepted.

The ASLAB summarized the Interior Department's and other witnesses' testimony and evidence of the chief factors of direct harm to the Lakeshore environment: (1) lowering the ground water table during construction would concomitantly lower the water level of bogs and ponds in the National Lakeshore, permanently damaging the delicate ecological systems in those unique wetlands; (2) operation of the facility's cooling tower will emit a water vapor plume that would (a) merge with chemical emissions from nearby industrial smokestacks to form an "acid mist" deleterious to Lakeshore biota, (b) deposit salt residues that will further injure the Lakeshore biota as well as pollute Lake Michigan and (c) worsen weather conditions in the area; (3) operations of the nuclear facility would pollute Lake Michigan with undesirable (including

radioactive) waste materials; (4) use of ash ponds now on the Bailly property in conjunction with the new facility would pollute the National Lakeshore into which they assertedly drain; (5) intake of additional cooling water for the nuclear facility would destroy substantial quantities of fish in the Lake; and (6) the cooling tower would constitute a "visual intrusion" looming unattractively over the natural horizons of the Lakeshore. *NIPSCO*, ALAB-224, *supra* at 259.

In regard to the massive visual intrusion of the cooling tower 400-450 feet tall and 440 feet in diameter at its base, from the top of which "[d]uring operation, there will always be a visible plume . . . ranging in length from a few tower heights to several miles," (*NIPSCO*, LBP-74-4, *supra* at 599 (Finding 131)), ASLB found:

> We find that the proposed natural draft cooling tower constitutes a man-made, visual intrusion which is an adverse environmental impact on the Bailly plant.

Id. at 600 (Finding 133).

This finding although "factored into" the total consideration was ignored.

D

We have considered the population density and environs factors within the 30-75 mile zone around Bailly (IV A and B, *supra*) and within the two-mile (third buffer) zone around Bailly (III, *supra*) as well as the abutting environment (IV C, *supra*). Next we consider the two closest population zones (the first and second buffer zones).

The first zone or "exclusion area" is the place where the reactor is situated and a relatively small area im-

mediately surrounding the physical plant.[25] In this case the ASLB and ASLAB approved an exclusion area of 188 meters or .1168 mile or approximately 1/10th of a mile.

Before examining in detail two AEC documents which we have briefly referred to earlier, the 1973 Working Paper on population distribution and Draft Regulatory Guide 4.7 on general site suitability criteria, it is necessary to make a few observations.

The AEC had been striving, prior to its recent demise in favor of NRC, to standardize its approach to the licensing of nuclear power plants.[26] One of the more im-

[25] 10 C.F.R. § 100.3(a) provides the definition:

> "Exclusion area" means that area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. This area may be traversed by a highway, railroad, or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility and provided appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway, in case of emergency, to protect the public health and safety. Residence within the exclusion area shall normally be prohibited. In any event, residents shall be subject to ready removal in case of necessity. Activities unrelated to operation of the reactor may be permitted in an exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result.

[26] Commission Policy Statement on Standardization of Nuclear Power Plants (April 28, 1972); Statement on Methods for Achieving Standardization of Nuclear Power Plants (March 5, 1973).

portant benefits of increased standardization anticipated by AEC was the enhancement of reactor safety.[27]

Draft Regulatory Guide 4.7 is part of the standardization process,[28] and the 1973 Working Paper,[29] which the ASLAB dismissed as "simply a tentative position proposed by some members of the regulatory staff" (*NIPSCO*, ALAB-224, *supra* at 254), was accompanied by the AEC's own press release which stated:

> The AEC is continuing work to develop generally applicable environmental siting guides for nuclear power plants.

AEC Press Release, T-160 at 1 (April 9, 1974).

We use both the guide and the working paper, not as superseding the Commission's regulations, but merely as an expression of at least some AEC expertise to be examined in areas where the regulations are not clear or specific. We assume that if they offered no guidance, the AEC would not have issued and released them.

In Part III *supra*, we found that the Commission had violated its own regulations. In Part IV, we are examining other aspects of the AEC's action in granting the Bailly permit to determine whether, on balance, the extraordinary result of halting or delaying the development of needed energy is warranted by the Com-

[27] Trosten & Moore, *Nuclear Power Plant Standardization: Promises and Pitfalls*, 15 WM. & MARY L. REV. 527, 531 (1974); Shapar & Malsch, *Proposed Changes in the Nuclear Power Plant Licensing Process: The Choice of Putting a Finger in the Dike or Building a New Dike*, 15 WM. & MARY L. REV. 539, 541 (1974).

[28] The Guide notes at the outset: "Regulatory Guides are issued to describe and make available to the public methods acceptable to the AEC Regulatory staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents or to provide guidance to applicants." DRAFT REGULATORY GUIDE, *supra* at 1.

[29] The 1973 Working Paper is dated April 17, 1973, and was released by the AEC for public distribution about one year later, April 9, 1974, a few days after ASLB had rendered its decision in this case.

mission's violation of its regulations. In this latter inquiry we seek, not eschew, whatever expertise the AEC has to offer, including the guide and the working paper.

The working paper proposes the following regulatory position:

> Applications for sites having a cumulative population projected from the date of application for a construction permit . . . greater than 30,000 within 5 miles, 500,000 within 20 miles or 2,000,000 within 40 miles should:
>
> (a) Present an analysis of alternative sites, including a showing that the proposed site offers significant advantages from the standpoint of environmental, economic or other fac[illegible]s.
>
> (b) Provide state-of-the-art engineered safety features to assure that the conservatively calculated consequences of postulated design basis accidents are significantly below the dose guidelines of 10 CFR Part 100.
>
> (c) Have a minimum exclusion distance of at least 0.4 mile and a low population zone of at least two miles.

STAFF WORKING PAPER, *supra* note 16 at A-4.

It was stipulated that the projected population at Bailly in 1985 would be as follows:

0—5 miles	29,793
0—20 miles	700,000
0—40 miles	6,000,000

In addition to consideration of alternate sites and added safety features, such a site calls for "a minimum exclusion distance of at least 0.4 mile" or 4/10th of a mile or four times greater than that proposed for Bailly.

Draft Regulatory Guide 4.7 provides that "[b]ased on past expegience, the Regulatory staff has found that a minimum exclusion distance of 0.4 mile . . . usually provides assurance that engineered safety features can be designed to bring the calculated dose from a postulated accident within the guidelines of 10 CFR Part 100." DRAFT REGULATORY GUIDE, *supra* at 17-18.

If the exclusion area or first buffer zone in the present case were to be increased fourfold, it would extend beyond the NIPSCO-owned property into areas where NIPSCO could not "determine all activities"[30] and would raise serious questions of interference with the authority of the Secretary of the Interior over the National Lakeshore.[31]

A similar problem exists in connection with the second buffer area—the low population zone.[32] The low population zone here was established by the ASLB and ASLAB at 1.5 miles. The working paper establishes "a low population zone of at least 2 miles" (STAFF WORKING PAPER, *supra* note 16 at A-4) and the guide states that "the Regulatory staff has found that a distance of 3 miles to the outer boundary of the LPZ is usually adequate." DRAFT REGULATORY GUIDE, *supra* at 18.

Even at 1.5 miles, the LPZ extends over about 640 acres of Class IV land, namely "an outstanding natural area of special significance for public edification." *NIPSCO*, LBP-74-19, *supra* at 586. But more

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[30] *See* note 25 *supra*.

[31] The findings of ASLB indicated that the .1168 mile exclusion area would fall short of the shoreline of Lake Michigan (*NIPSCO*, LBP-74-19, *supra* at 561) and presumably totally within the NIPSCO-owned property. The Illinois Attorney General tells us in his brief that "the balance of the 0.4 mile requirement [the exclusion area] would extend into the National Lakeshore a distance of some 1,312 feet." (Br. at 9).

[32] 10 C.F.R. § 100.3(b) provides:

> "Low population zone" means the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident. These guides do not specify a permissible population density or total population within this zone because the situation may vary from case to case. Whether a specific number of people can, for example, be evacuated from a specific area, or instructed to take shelter, on a timely basis will depend on many factors such as location, number and size of highways, scope and extent of advance planning, and actual distribution of residents within the area.

significantly, it is anticipated that as many as 87,000 persons a day will visit the Dunes National Lakeshore and State Park (Joint Intervenors' Ex. 23). It must be presumed that a large number of people will be on the affected 640 acres at any particular time.

Although 10 C.F.R. § 100.3(b) speaks of the protection of residents, the need to protect visitors or transients regularly present is equally as great.[33] The ASLAB acknowledged that "[t]o be sure, were there any accident at Bailly, it might be necessary to evacuate visitors from the National Lakeshore as from other surrounding areas," (*NIPSCO*, ALAB-224, *supra* at 261 n.34), but dismissed this "remote contingency" by saying that the National Lakeshore superintendent could "work it out." *Id.* It appears to us that this problem should be worked out in advance by AEC and the utility seeking a license, rather than by what it is anticipated a third party may do.

Furthermore, the third party, in this case the Department of Interior, has not reacted in a very reassuring manner in regard to this problem. The Master Plan for the Dunes National Lakeshore (Joint Intervenors' Ex. 23) says:

> Because the population is expanding and outdoor recreational opportunities are restricted in the

[33] In *Southern California Edison Co.*, the ASLAB said:

> To be sure, Part 100 refers expressly only to the need to protect "residents" within the low population zone. But we are aware of no basis for concluding that the Commission intended that term to be given a narrow, literal construction, which would exclude consideration of the safety of large numbers of transients regularly present within the low population zone. The need to protect such visitors is just as great as the need to protect permanent residents; if anything, greater steps will need to be taken to protect the visitors, who are likely to be relatively unfamiliar with the surrounding area and who will not have homes in which to take shelter. We thus decline to read the word "residents" as expressing a Commission intention to protect permanent residents but to ignore the safety of visitors.

Southern California Edison Co., ALAB-248, *supra* at 962.

> Calumet Region as well as in the National Lakeshore, the potential number of visitors at peak times cannot be adequately handled.

And this is in reference to a quiet Sunday afternoon. What would occur if a large but unknown number of campers and visitors, unfamiliar with the area and with no nearby homes in which to take shelter, heard a public address announcement to evacuate the area due to a nuclear accident? Their path would be blocked on the north by Lake Michigan and on the west and south by NIPSCO's and Bethlehem Steel Corporation's plants and industrial complex. It strains credulity to expect that this problem will work itself out and it is ridiculous to in effect say that it should be left to fortune.

What we have considered in sections A through D above is concerned with "population density and use characteristics of the site environs." 10 C.F.R. § 100.10(b).

V

We are compelled to conclude that since the AEC did not comply with its own applicable regulations (Part III, *supra*), which are binding on it,[34] and since there are so many persuasive reasons for requiring it to comply with

[34] *Yellin v. United States*, 374 U.S. 109 (1963); *Service v. Dulles*, 354 U.S. 363 (1957); *United States ex rel. Accardi v. Shaughnessy*, 347 U.S. 260 (1954). *See also* Judge Irving R. Kaufman, *Judicial Review of Agency Action: A Judge's Unburdening*, 45 N.Y.U.L. Rev. 201 (1970).

those regulations in this case (Part IV, *supra*), the AEC's decision of August 29, 1974 is unlawful and is hereby set aside.[35]

In view of this result and in response to Joint Intervenors' motion for clarification of our October 16 stay order, which now becomes permanent, we hold that NIPSCO is required to fill in the existing excavation on the site as well as to cease any further site dewatering.

[35] Judicial review of AEC action pursuant to 42 U.S.C. § 2239(b) is in accordance with section 10 of the Administrative Procedure Act which provides in part:

> The reviewing court shall— . . .
>
> (2) hold unlawful and set aside agency action, findings, and conclusions found to be—
>
> (A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;
>
> • • •
>
> (D) without observance of procedure required by law . . . .

5 U.S.C. § 706.

TONE, *Circuit Judge*, dissenting. Congress committed to an expert administrative agency, not to the courts, the responsibility both of protecting public safety and health and of accommodating energy needs and environmental interests in the licensing and regulation of commercial nuclear power plants. At the time of the administrative proceedings we are reviewing, that agency was the Atomic Energy Commission.[1] We of course owe the expertise of an agency responsible for regulating the use of nuclear power the same deference we owe the expertise of other agencies, even though we have the normal human distrust of such an awesome force as nuclear reaction and fear that the consequences of a miscalculation may be catastrophic. Congress no doubt had the same distrust and fear, but it nevertheless chose the policy of providing for the development of nuclear power as a source of energy and relied upon the agency's expert judgment to protect society's interests. Congress limited the courts' role to review of the agency's actions in accordance with the Administrative Procedure Act. I think that in this case the court has overstepped the limits of that role and substituted its judgment for that of the agency.

The court's decision turns primarily upon the meaning of the words, "the nearest boundary of a densely populated center containing more than about 25,000 residents," which appear in the Commission's regulation dealing with reactor site criteria. (10 C.F.R. § 100.11(a)(3) (1974).) The court holds that these words refer to the political boundary of a city and not, as the agency construed them, "that portion of the population center at which the dense population starts." In rejecting the argument that the words refer to a political

[1] The Energy Reorganization Act of 1974 (88 Stat. 1233) transferred "all the licensing and related regulatory functions of the Atomic Energy Commission," including the functions of the Atomic Safety and Licensing Board Panel and the Atomic Safety and Licensing Appeal Board, to the newly-created Nuclear Regulatory Commission. (§§201(f) and (g) of the Act.) Despite what is said in the introductory portion of Part IV of the majority opinion, I take it there can be no dispute that the standards of review are the same for the orders of the old and the new commissions.

boundary, the Atomic Safety and Licensing Board, whose order was affirmed by the Appeals Board, noted that the regulation also provides,

> "In applying this guide [that the population center distance be at least one and one third times the distance to the low population zone boundary], due consideration should be given to population distribution within the population center,"

and concluded that,

> "giving due consideration to the low population density of those areas closer than 4.5 miles to the Bailly reactor, principally industrial areas of the City of Portage, the provisions of Part 100 [of the regulations] with respect to population center distance are satisfied."

The Atomic Energy Commission's interpretation of its own regulation is entitled to "that respect which is customarily given to a practical administrative construction of a disputed provision." *Power Reactor Development Co. v. Electrical Union*, 367 U.S. 396, 408 (1961). "[S]ince the meaning of the language is not free from doubt, we are obligated to regard as controlling a reasonable, consistently applied administrative interpretation . . . ." *Ehlert v. United States*, 402 U.S. 99, 105 (1971). The only suggestion in the court's opinion in the case at bar that the agency has not consistently interpreted the disputed regulation is the reference to *Southern California Edison Co. (San Onofre Station)*, ALAB-248, RAI-74-12, 957 (Dec. 24, 1974). The Commission's position in that case, however, that city boundaries are not controlling when densely populated areas extend outside those boundaries, is entirely consistent with its position here. In both cases the location of populated areas rather than of political boundaries is viewed as controlling.

I do not understand why that is not the most sensible interpretation of the regulation, as well as the one to which we owe respect as the agency's expert interpretation. Since the purpose of the regulation is to separate the reactor site from densely populated areas, we would

expect the draftsmen to be concerned with the location of those areas rather than political lines. Nowhere in the regulation is there any reference to a city, village, town, or other political subdivision. Instead the terms used are "population center" and "densely populated center" (10 C.F.R. §§ 100.3(c), 100.11(a)(3) (1974)), evidencing an intention to describe de facto concentrations of population rather than political subdivisions. The term "boundary" is used with reference to such a concentration or center, as the agency correctly concluded.

The court's discussion of the evidence concerning population distribution, which is found near the end of Part III of the opinion, appears to be intended to illustrate the difficulty of finding the boundaries of a de facto population center, rather than an alternative holding that, even if the boundary referred to is that of such a center, the agency's finding as to the location of the boundary is not supportable. Nevertheless, implicit in the court's discussion is a rejection of the agency's findings on this point, which I think are supported by substantial evidence, as required by section 10 of the Administrative Procedure Act (5 U.S.C. § 706(2)(E)), under which our review is conducted.[2] It is true that the map used in the presentation of the evidence on population center distances was five or six years old. But there was ample additional evidence, which we would surely find sufficient if we were reviewing the judgment of a district court or an order of another agency, that the land within the two-mile population center distance, and

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[2] Petitioners appear not to have preserved for judicial review the sufficiency of the evidence on this point. They did not challenge the sufficiency of this evidence in their 78-page brief before the Appeal Board, though they later attempted to do so in a supplemental brief, which the Board refused to allow them to file. Cf. *United States v. Tucker Truck Lines*, 344 U.S. 33, 37 (1952).

indeed beyond, is not densely populated;[3] that its present and probable future development is principally industrial;[4] and that extensive residential development would be unlikely anywhere within the two-mile zone because of the industrial zoning, the industrial uses already there, and the availability of land elsewhere which is more desirable for residential use. It was for the agency and not this court to weigh and appraise that evidence.

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[3] It is noteworthy that the parties opposing the agency before the court, while criticizing the map as too old and too vague, do not contend that the record shows, or that there are in fact, densely populated areas within the two-mile zone. The reason for this is suggested by the 1970 Census, of which we may take judicial notice. About 95 per cent of the land within the City of Portage that is also within the two-mile radius appears to be north of the Penn Central (formerly New York Central) railroad track. As we read the 1970 Census, it shows that the census taker found no residents in that area. The remaining 5 per cent of the land which is within both Portage and the two-mile radius represents what appears to be less than 5 per cent of the land area in the next census block to the south of the railroad. A total of 81 residents were found in that entire census block. See U.S. Bureau of the Census, *Census of Housing: 1970 BLOCK STATISTICS* Final Report HC(3)-68 Chicago Ill.—Northwestern Indiana Urbanized Area (1972).

As to the argument that the pink areas on the map have no probative value, we note testimony in the record that "the definition of pink tinted areas here by the Geological Survey is that population density which is too sense [obviously a misprision for 'dense'] to indicate the houses by themselves," because if individual houses were indicated "there would be no opportunity to indicate the other significant landmarks." This testimony is consistent with U.S. Dep't of Interior, Geological Survey, *Topographic Map Information and Symbols* (1972), which explains that "red tint" is used to represent urban areas, in which only landmark buildings are shown. The nearest periphery of the nearest pink area was approximately four and one-half miles away from the proposed reactor site.

[4] The evidence shows that the bulk of the land within the two-mile radius and not within the National Lakeshore is zoned for industrial use and, to the extent it is developed, is devoted primarily to industrial uses, and that all of the small part of Portage within the two-mile radius is in the industrial category, which explains why few, if any, persons live in that area. See note 3, *supra*.

Other grounds put forward in Part III of the court's opinion seem to me to be unpersuasive. The outer border of the census enumeration district, which no one contends is the boundary referred to in the regulation and which, within the two-mile radius, coincides with the city limits of Portage, has no relevance to population density; census enumeration districts often include large tracts where no one at all lives, as is the case here.[5] The regulation cannot reasonably be interpreted to mean that other small residential communities near the proposed site are to be deemed within the densely populated center even though they are separated from it by substantial distances.

The subjects discussed in Part IV of the opinion are not set forth as grounds for the court's decision, and I shall not, therefore, lengthen this dissent by discussing them in detail. It is enough to say that the location of this plant in relation to others in the area is a matter peculiarly within the province of the Commission; that we are in no position to judge whether the agency's rulings on other license applications on entirely different records of which we have little knowledge are consistent

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[5] According to the 1970 Census there were no residents in the area about two and one-half miles long and over one mile wide running generally west from the proposed site along the shore of the lake to Burns Waterway. That area, which includes all but about 5 per cent of the part of Portage that is within the two-mile radius (see note 3, *supra*), is the part of Census Enumeration District 719 (to which the majority refers) nearest to the site.

Census enumeration districts are "small population areas averaging about 250 housing units and are defined by the Census Bureau" for use in "the collection and tabulation of population and census data." U.S. Bureau of the Census, *1970 Census Users' Guide pt. I*, 87-88 (1970). Criteria used in determining enumeration districts are "(1) the estimated population size of the ED should constitute an adequate enumerator workload; and (2) the enumeration district must fall within the boundaries of certain areas for which the results are to be tabulated, i.e., tracts, cities, minor civil divisions, etc." *Id.* at 88. These districts are "administrative areas" and represent "a work assignment for a single enumerator." They "may range in size from a city block to several hundred square miles, but usually encompass from 750 to 1,500 persons." *Id.* at 22.

with its ruling here; that the agency carefully considered the environmental impact on the National Lakeshore and its findings on that subject find ample support in the evidence; that Congress did not give the Assistant Secretary of the Interior a veto power over the Commission's decision of issues entrusted to it by Congress for decision; and that we cannot reverse the Commission for applying its regulations instead of proposals and views put forward by some of its staff but not adopted by the Commission. In this part of the opinion, as in Part III, the court has invaded the function of the Commission.

A true Copy:

Teste:

Clerk of the United States Court of Appeals for the Seventh Circuit

(Caption omitted in printing)

May 28, 1975

Order Upon Denial of Petitions for Rehearing

On consideration of the petitions for rehearing filed in the above-entitled cause, a majority of the panel voted to deny the petitions. However, in the government's petition for rehearing, the government questioned whether this court "intends to enjoin NIPSCO from building a nuclear plant at the Bailly site forever" and argued that the Nuclear Regulatory Commission should have an opportunity to take "a fresh look at the question" and to determine whether the low population zone "could be cut down enough, and whether that would require additional safety features for the plant."

The opinion and judgment in this case merely set aside the Atomic Energy Commission's decision of August 29, 1974 affirming the issuance of a construction permit. We find nothing in the Atomic Energy Act of 1954 or the Energy Reorganization Act of 1974 which would prevent NIPSCO from applying for another license or would prevent NRC from considering such new application.

This court's reference at the close of the opinion to making the stay permanent and to filling in the existing excavation pertains solely to action in reliance upon the license set aside by the court's judgment.

It Is Hereby Ordered that the petitions for rehearing be, and the same are hereby, Denied.

(Caption omitted in printing)

May 28, 1975

Order Upon Denial of Suggestion for Rehearing En Banc

On consideration of the suggestion for rehearing *en banc* filed in the above-entitled cause, Circuit Judges Pell, Stevens, Tone and Bauer voted to order a rehearing *en banc*. Circuit Judges Fairchild, Cummings and Sprecher voted to deny rehearing *en banc*. Circuit Judge Swygert took no part. Accordingly, the suggestion for rehearing *en banc* failed to receive the votes of a majority of the circuit judges in regular active service and the suggestion is denied. 28 U.S.C. § 46.

IT IS HEREBY ORDERED that the suggestion for rehearing *en banc* be, and the same is hereby, DENIED.

(Caption omitted in printing)

June 4, 1975

Order

This matter comes before the court on the "Northern Indiana Public Service Company's Motion For A Stay Of Mandate Pending Application For Certiorari" filed herein on June 2, 1975 and the "Motion For Stay Or Mandate Pending Application For Certiorari" filed herein on June 3, 1975 by counsel for the Government. Upon consideration whereof,

IT IS ORDERED that both of the aforesaid motions are hereby GRANTED. The mandate of this Court is stayed only for a period of thirty (30) days pursuant to the provisions of Rule 41(b) of the Federal Rules of Appellate Procedure.

UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

JEROME GARFINKEL, *Chairman*
WALTER H. JORDAN, *Member*
HARRY FOREMAN, *Member*

In the Matter of:
NORTHERN INDIANA PUBLIC SERVICE COMPANY
(Bailly Generating Station, Nuclear-1)

Docket No. 50-367

Construction Permit April 5, 1974

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Regulatory Staff of the
Atomic Energy Commission

Initial Decision

I. Background

A. *Procedure*

In this proceeding Northern Indiana Public Service Company (Applicant) [1] is seeking a permit to construct a boiling water nuclear power reactor designed to operate initially at 1931 megawatts thermal, with a gross electrical output of 685 megawatts electrical (Appl. Ex.[2] 1A; Safety Evaluation Report, following Tr. 741, p. 1; Notice of Hearing of the Atomic Energy Commission (Commission), 36 F.R. 25175). The proposed facility will be located on Applicant's site on the southern shore of Lake Michigan, Westchester Township, Porter County, Indiana (Appl. Ex.[3] 1A; S.E.R., following Tr. 741, p. 1).

2. The Notice of Hearing on the application for a construction permit was issued by the Commission on (published on December 29, 1971, 36 F.R. 25175). Parties wishing to intervene were required to file petitions not later than thirty (30) days from the date of publication of the Notice of Hearing in the Federal Register. In accordance with this mandate a number of petitions to intervene were filed. Ultimately, Porter County Chapter of Izaak Walton League of America, Inc., Concerned Citizens Against the Bailly Nuclear Site; Businessmen for

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[1] Also referred to as NIPSCO.

[2] Appl.=Applicant.

Other abbreviations used in this decision:

Ex.=Exhibit	p.=page
Tr.=Transcript	pp.=pages

S.E.R.=Regulatory Staff's Safety Evaluation Report
F.E.S.=Final Environmental Statement of the Regulatory Staff
PSAR=Preliminary Safety Analysis Report
E.R.=Environmental Report of the Applicant
J.I.=Joint Intervenors Reg.=Regulatory

[3] Application for Construction Permit.

the Public Interest, Inc., James E. Newman, Edward W. Osann, Jr., Mildred Warner, and George Hanks, in their individual capacity, and Bethlehem Steel Corporation, were admitted as parties. The Porter County Chapter of the Izaak Walton League of America, Inc., Concerned Citizens Against the Bailly Nuclear Site, Businessmen for the Public Interest, Inc., and James E. Newman, Edward W. Osann, Jr., Mildred Warner, and George Hanks were admitted as Joint Intervenors, with their participation being conditioned to specific contentions and their representation through a single counsel (Edward W. Osann, Jr.). The Joint Intervenors filed a substantial number of contentions, of which approximately forty-five were admitted by the Atomic Safety and Licensing Board (Board).[4] These contentions are either directly or inferentially considered by the Board in its findings herein.

3. Bethlehem Steel Corporation was admitted as a party intervenor in this proceeding limited to the issue of emergency evacuation plans (Order Permitting Intervention, May 15, 1972). This intervenor did not actively participate in the evidentiary hearing stage of the proceeding.

4. The Board denied a motion filed by the Joint Intervenors to add Elmer Dee Anderson, II, as a Joint Intervenor (Tr. 4944-4966).

5. The Notice of Hearing also advised the public that limited appearances would be permitted at the time of hearing. A substantial number of individuals made oral appearances, and a number filed written statements (see October 10 and 11, 1972 Transcripts).

6. An Atomic Safety and Licensing Board was established on January 12, 1972, in accordance with the Atomic

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[4] See: Order Permitting Intervention, May 15, 1972; Environmental Prehearing Conference Order of the Atomic Safety and Licensing Board, November 15, 1972; and Prehearing Conference Order, March 21, 1973.

Energy Act, as amended, and the Commission's regulations. Because of other commitments, certain members of the Board were unable to continue to serve subsequent to the first prehearing conference. Consequently, a "Notice of Reconstitution of Board" was issued on June 20, 1972, establishing the instant Board which presided over the entire evidentiary hearing in this proceeding.

7. The evidentiary hearing in this proceeding commenced on October 10, 1972, and this initial session lasted four days. At this initial session, counsel for the Joint Intervenors announced that his clients would not participate in this session because they felt the rules of the Commission and the procedural rulings of the Board denied them a full and fair hearing on nuclear safety (Tr. 485). The Board urged that, since matters involving information disclosed by the Regulatory Staff under Joint Intervenors' Freedom of Information Act request could be raised subsequently, Joint Intervenors should participate in the hearings as scheduled (Tr. 491-495). The Joint Intervenors nevertheless left the hearing and did not further participate in the October 1972 evidentiary hearing (Tr. 510). Although the Board had authority under the Commission's Rules of Practice to declare the Joint Intervenors in default and dismiss their petition of Intervention,[8] notwithstanding their action, the Board declined to take such extreme measures and concluded the ends of justice would be better served by permitting their subsequent participation in this proceeding. However, it was determined the "walkout" should not go unpenalized. The Board decreed that the Joint Intervenors would be barred from cross-examining at a subsequent date any witness called by either the Applicant or the Regulatory Staff during the October 10-13 session with respect to Joint Intervenors' contentions 16, 17, 19 and 21.

[8] 10 CFR § 2.707.

The evidentiary hearings were reconvened on April 30, 1973, and were concluded on November 14, 1973, after 65 days of testimony. Proposed Findings were filed by the Applicant, Regulatory Staff, and Joint Intervenors. Oral Argument on proposed findings were held on February 19, 1974.

B. *Issue To Be Decided In This Proceeding*

8. In its Notice of Hearing, the Commission directed that the Board make specific findings concerning Applicant's compliance with the provisions of 10 CFR § 50.35 (a), in considering whether a construction permit should be granted for the Bailly Generating Station, Nuclear-1. In addition, the Board is also required to make findings with respect to the following health and safety matters:

a. whether the Applicant is financially qualified to design and construct the proposed facility;

b. whether the Applicant is technically qualified to design and construct the proposed facility; and

c. whether the issuance of a permit for construction of the facility will be inimical to the common defense and security or to the health and safety of the public.

9. In addition to considering health and safety issues, the Notice required that the Board make determinations pertaining to compliance with Appendix D of 10 CFR Part 50, but more specifically the Board was directed to:

a. determine whether the requirements of Section 102(2)(C) and (D) of the National Environmental Policy Act have been complied with;

b. independently consider the final balance among conflicting factors to determine the appropriate action to be taken; and

c. determine whether the construction permit should be granted, denied or appropriately conditioned to protect environmental values.

10. Also, the issues raised by the contentions will be discussed within the framework of the Commission's instructions to the Board.

C. *Status Of Proposed Findings Of The Parties*

11. All proposed findings submitted by the parties which are not incorporated directly or inferentially in this Initial Decision are herewith rejected as being insupportable in law or fact, or as being unnecessary to the rendering of this Initial Decision.

II. Findings on the Health and Safety Matters

A. *General Description Of Site And Plant*

12. *Site*—The site of the Bailly Generating Station is an L-shaped 350-acre tract of land in Porter County, Indiana on the shore of Lake Michigan. Because much of the tract is a long access corridor (leg of the L), the exclusion area encloses about 107 acres. Two coal-fired power plants and one gas turbine peaking plant are located within the exclusion area. The site is bounded on the north by Lake Michigan, on the east by the village of Dune Acres and the Indiana Dunes National Lakeshore and on the south and west by Bethlehem Steel Corporation Burns Harbor Plant (S.E.R., following Tr. 741, pp. 1-3; Vol. 1 PSAR 2.2-1).[6]

13. The resident population is very small, out to two miles from the plant due to the heavy industrialization of the area. The area south and west of the site is mainly agricultural at distances greater than five miles (S.E.R., p. 3; PSAR, Vol. 1, pp. 2.2-1, -2).

[6] Appl. Ex. 1B.

14. For assessment of the site in accordance with the Commission's site Criteria in 10 CFR Part 100, the Applicant and Staff used a minimum exclusion distance of 188 meters to the west of the reactor building and a low population zone radius of 1.5 miles (2400 meters). The exclusion area boundary defined by the Applicant does not extend to the shoreline of Lake Michigan. The low population zone encompasses a portion of the Indiana National Lakeshore and Bethlehem Steel Company's Burns Harbor Plant (S.E.R., p. 4; PSAR, Vol. 1, p. 2-2-35). There are no schools, hospitals or institutions within the low population zone.

15. *Plant Description*—The nuclear steam supply system is a General Electric Company (GE) boiling water reactor (BWR) which generates steam for direct use in the steam turbine-generator (S.E.R., p. 16; PSAR, Vol. 1, pp. 1.5-1, -2).

16. The reactor is located in the containment structure. The containment systems include the primary containment using the pressure suppression concept and the secondary confinement which includes the reactor building, its recirculating (atmospheric ventilation) system, and the standby gas treatment system (SGTS). The drywell is a steel-lined, prestressed concrete vessel in the shape of a frustrum of a cone. The vapor suppression chamber is a steel-lined, prestressed concrete right circular cylinder located directly beneath the drywell. The drywell and wetwell are separated by a reinforced concrete floor penetrated by 60 vent pipes. A low-leakage reactor building surrounds the primary containment to serve as a secondary containment (S.E.R., p. 50; PSAR, Secs. 3, 4 and 5.2).[7]

17. Except for its nuclear steam supply system, the Station will operate on the same principle as fossil-fueled power plants, that is, by converting thermal energy to

[7] Appl. Ex. 1B, 1C.

electrical energy via a Rankine steam cycle. The steam generated in the reactor passes directly to the turbine-generator. Steam leaves the reactor vessel at approximately 1020 psia and enters the turbine at about 965 psia. The turbine-generator is a tandem compound unit having a 4-flow exhaust end. Spent steam, after passing through the turbine, is condensed to water and, after demineralization, the water is recycled to the reactor core. The Station utilizes a hyperbolic natural-draft cooling tower for dissipating the heat rejected from the Station's steam cycle. All the heat from the turbine exhaust condensers is dissipated to the atmosphere through this cooling tower (F.E.S., p. III-4).[8] The makeup for cooling tower evaporation, drift, and blowdown is obtained from Lake Michigan through the service water pumping system. The service water system for the Station has three intake pumps to be located in a new pump house that will be constructed. The water for these pumps is withdrawn from the existing intake crib for Units 7 and 8 by tapping into the two 42-inch diameter lines. The intake well for Units 7 and 8 is located in the lake about 1500 feet from Shoreline north of the crib house (F.E.S., p. III-6).

B. *Radiological Issues Concerning Siting*

18. During the course of the hearing, a number of issues were raised concerning the location of Bailly. From the standpoint of radiological considerations, Intervenors challenged: the adequacy of the exclusion distance, on the grounds that the Bailly facility was novel in design and the accuracy of selection of the population center distance (Contentions 45, 46 and 47); the ability to take protective action for persons in that portion of the National Lakeshore which was encompassed by a portion of the LPZ (Contention 19); the adequacy of geological data on which seismic designs were based (Contention 56); and

[8] Reg. Staff's Ex. 5.

the adequacy of design in accounting for tornadic forces (Contention 57). Other radiological contentions concerning the design of specific systems also involve certain physical characteristics of the site, including hydrological characteristics considered in connection with the contention relating to contamination of water supplies (Contention 55).

19. The principal thrust of these contentions related primarily to Joint Intervenors' assertions that the Bailly reactor is "novel and unproven." If so, they contend that the site criteria in Part 100 should be applied on the basis of TID 14844 guidelines without giving any consideration to the effect of engineered safeguards systems in assessing site suitability. In the absence of consideration of the effect of engineered safeguards systems, the Joint Intervenors assert that Part 100 would require either that Bailly N-1 Station have an exclusion distance of 4,650 feet, a low population zone radius of 16.8 miles, and a population center distance of thirty (30) miles or, conversely, that the power level of a facility to be located at the Bailly site be restricted to 33 MWt.

20. In assessing whether the site complied with the criteria set forth in Part 100, the Applicant and the Regulatory Staff utilized the methods described in Safety Guide 3 which takes into consideration the effect of various engineered safety features in reducing releases in the event of accidents assumed for purposes of Part 100 computations. Both the Regulatory Staff and the Applicant concluded that the calculated doses at the boundary of the 188 meter exclusion area and the 1.5 mile LPZ would comply with the criteria of Part 100, although the Staff's estimates were more conservative than those of the Applicant (S.E.R., Sections 2.1 and 10.1-10.7; PSAR, Vol. 1, Sec. 14).[9]

[9] Appl. Ex. 1E.

21. After a careful analysis of the record in this proceeding, we cannot accept the assessments made by the Joint Intervenors that the proposed Bailly Generating Station is novel and unproven. The Bailly design is functionally the same as other BWR facilities, both larger and smaller than Bailly which are in operation and under construction (Butler, following Tr. 5278; Tr. 5280-82; Davis, following Tr. 1807; S.E.R., pp. 17-21). Moreover, the basic design characteristics for BWR's have been demonstrated and proved out over many years of operation of a number of progressively larger facilities, since the development work at the Vallecitos Boiling Water Reactors as the prototype for the first commercial BWR power facilitiy at Dresden Unit 1 (Davis, following Tr. 1807), and have been successfully proven in the operation of much larger BWR units such as Quad Cities, Millstone, Oyster Creek, Dresden and Monticello (Butler, following Tr. 5278). Differences between Bailly and these other facilities relate principally to difference in physical details such as size and configuration and in the use of improved engineered safety systems in the Bailly design (Tr. 5279-5286). The design variables have been conservatively estimated to assure that the design will provide adequate safety protection (Tr. 5294-5299, 5309-5329).

We do not find significant Joint Intervenors' reliance on the stipulated fact that the emergency core cooling system (ECCS) of the proposed Bailly facility has never been experimentally tested under full scale LOCA conditions. All that is necessary is that the Bailly ECCS meet the Commission's Interim Acceptance Criteria. *Consumers Power Company (Midland Units 1 and 2)*, ALAB-123, RAI-73-5 331, at 341-2 (May 18, 1973). The evidentiary record reveals that the Bailly ECCS fully complies with the Interim Acceptance Criteria (S.E.R., p. 79 *et seq.;* Butler and Minners, following Tr. 5278, pp. 1-5; Tr. 5306-5308, 5321-5327).

The record fully supports a finding that the proposed Bailly reactor design is not unproven as a prototype, nor is it novel in design and, accordingly, appropriate credit must be given to its engineered safeguards in determining compliance with 10 CFR Part 100.

22. During the proceeding, the Joint Intervenors have asserted that the construction permit cannot issue unless the complete designs for the various systems and components have been prepared and submitted. The Appeal Board decision in the *Consumers Power Company* proceeding, ALAB-123, RAI-73-5 331 at p. 355 (May 18, 1973), deals with this issue and rules otherwise. See *Power Reactor Development Co. v. International Union of Electrical Radio and Machine Workers, AFL-CIO, et al.*, 367 U.S. 396, 6L ed 2d 924(1961), where the Supreme Court held that Section 50.35 of the Commission's Regulations permits the Commission to defer a definite safety finding until operation is actually licensed, and clearly suggests that the final design can be left to that stage of the licensing process (at pp. 400-408).

23. Intervenors offered into evidence "the ACRS generic letter" of December 19, 1972 (J.I. Ex. 27-A through 27-G) as "listing outstanding and unresolved concerns on the part of the ACRS" with respect to the matters described in the letter as unresolved. Intervenors asserted that such items should be resolved before issuance of a construction permit for Bailly. The Commission's response, dated February 5, 1973 to the ACRS, manifested the Commission's intent of continuing research in order to solve those items described as unresolved on a generic basis and to assure that such items were, in the meantime, resolved on a case by case basis (Tr. 7745). The Regulatory Staff's witness Dr. Butler, who was called with respect to this contention as Intervenors' witness, testified that applicable items on the ACRS unresolved list have been specifically considered in the review of the Bailly

reactor by the Regulatory Staff and the ACRS. All such items have been satisfactorily resolved with respect to the Bailly reactor (Tr. 7741).

ACRS communications relating to generic matters have been carefully considered by the Appeal Board in a number of proceedings. These cases conclude that specific items which are the subject of ACRS scrutiny on a generic basis may be satisfactorily dealt with in a particular proceeding. In *Long Island Lighting Company (Shoreham Nuclear Power Station)*, ALAB-156 RAI-73-10 844 at 935, the Appeal Board stated:

> ". . . The lack of resolution of certain items on a generic basis . . . does not mean that the item has not been satisfactorily dealt with in connection with a particular reactor." [10]

The record is undisputed that the Applicant and the Regulatory Staff have satisfied the questions raised by the ACRS in its December 18, 1972 letter.

24. Intervenors contended, and presented considerable testimony in support thereof, that the Applicant and Staff had relied on out-of-date maps in determining population center distances. The Board was particularly concerned with intervenors claim that the Applicant had erred in choosing Gary as the nearest population center, that indeed Portage would be the proper choice and that the nearest boundary was 1.1 miles from the reactor site (H. Read following Tr. 7391). Board questions directed to the Applicant and Staff revealed that the Applicant in the PSAR and the Staff in its S.E.R. considered the population center distance for purposes of determining compliance with 10 CFR 100 to be the distance to the city of Gary which was stated to be 5.5 miles from the site. (Tr. 6375).

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[10] See also Wisconsin Electric Power Company (Point Beach 2), ALAB-137, RAI-73-7 at 507-8.

Upon questioning concerning the City of Portage, the Staff acknowledged the expected population of Portage by 1980 would exceed 25,000, but for reasons given in the next paragraph, the Staff stated the correct population center distance of Portage was 4.5 miles (Tr. 6375). This distance was acceptable since the population center distance exceeded two miles, which is the minimum distance to the boundary of a population center required by 10 CFR Part 100.11(a)(3), for an LPZ of 1.5 miles.

25. The Regulatory Staff indicated that the distance it considered was the distance to the nearest heavily populated portion of the population center, not the distance to the political boundary which was used by Intervenors. To initially determine the heavily populated portion of the population center, the Staff used official U. S. Geological Survey (USGS) maps (Reg. Staff's Ex. 7) on which densely populated areas are depicted in pink. These maps show individual dwellings (Tr. 6376). Applicant's evidence based on population centroids of census enumeration districts substantiates the position that the pink areas on the USGS maps generally define the boundaries of dense population within the City of Portage (Brown, following Tr. 10451; Appl. Ex. 31). The evidence also demonstrates that dense population growth is unlikely within two miles of the site (Tr. 6387-89; Appl. Ex. 32; Tr. 10685-99; Snyder, following Tr. 10482).

25. Although there is some argument as to whether the political boundary should be used in determining the population center distance rather than the distance to that portion of the population center at which the dense population starts, the Board notes that 10 CFR Part 100.11(a)(3) specifically provides that "In applying this guide [that the population center distance be at least one and one third times the distance to the LPZ boundary], due consideration should be given to population distribution within the population center." The Board concludes that giving

due consideration to the low population density of those areas closer than 4.5 miles to the Bailly reactor, principally industrial areas of the City of Portage, the provisions of Part 100 with respect to population center distance are satisfied.

26. The Board concludes that the Bailly facility is not "novel in design and/or unproven as a prototype," that there is adequate evidence of compliance with the Interim Acceptance Criteria and an adequate description of the principal criteria and design bases of the various safety systems and components. The Board also finds that the Bailly site was properly evaluated using appropriate safety guides and satisfies the requirements of 10 CFR Part 100.

C. *Additional Technical Design Information To Be Supplied*

27. The evidence indicates that further technical or design information will be required from the Applicant prior to operation of the Bailly nuclear unit. Information and data that will be required to be provided in the final safety analysis report, and which can be left for such later consideration, include:

a. pipe whip restraints or high energy fluid lines (Branch, p. R-58-1, following Tr. 2416; Tr. 1482-84, 1490-1492, 1500-02, 2418-19; S.E.R., pp. 38-39; Burch, following Tr. 2416; Appl. Ex. 1C)

b. anticipated transients without scram (Appl. Ex. 1L; Tr. 2014, 10215; Reg. Staff's Ex. 11, pp. 7, 74; S.E.R., pp. 134-135);

c. post-LOCA hydrogen control (Appl. Ex. 1C, pp. 5.2-16.4, 5.2.3.9-4 (behind the red tab); Wattelet and Davis, following Tr. 557, pp. 2-5 and 2-6, S.E.R., pp. 85-86; Tr. 770, 771-772);

d. fuel densification (Appl. Ex. 27, pp. 4-5; Tr. 2536-37; Safety Evaluation Supplement No. 2, following Tr. 9826);

e. REVAB system (Rockwell, following Tr. 10636, p. 8; Tr. 1634-35, 1676-77, 1688-97, 10680-84; Appl. Ex. 1F, p. B.6-4; S.E.R., pp. 37-38, 95, 133);

f. main steam line isolation valve sealing system Benaroya, following Tr. 1568, p. 2; Tr. 1600-06, 2435, 7772-74; S.E.R., pp. 42-43);

g. rod sequence control system (S.E.R., pp. 116-120; Tr. 2536-39);

h. recirculation and flow control valves (S.E.R., Sections 14.4 and 14.6); and

i. ECCS (S.E.R., Section 6.1).

D. *Research And Development Required*

28. The record does not disclose any evidence suggesting that a research and development program, in the laboratory sense, is required to resolve safety issues in this proceeding. As previously discussed in paragraph 27, above, technical design data will be required to be supplied at the time of the application for an operating license.

E. Applicant's Financial Qualifications To Design And Construct The Proposed Facility

29. Northern Indiana Public Service Company, an Indiana corporation, is a public utility company engaged in supplying electrical energy and natural gas to the public in the State of Indiana (Petersen, Tr. following p. 546, pp. 1-2). The company operates in 30 counties in the northern part of Indiana, serving an area of about 12,000 square miles, with an estimated population of 2,080,000.

In the five-year period ended December 31, 1971, the company experienced a growth in the annual gross electric reveues of approximately 29%, and an increase of 28% in the kilowatt hour sales during the same five-year period. Electric revenues for the year 1971 totaled $132,135,833 (Petersen, pp. 1-2 and 1-3). Moody's Investor Service and Standard and Poor's have both assigned a AA rating to the NIPSCO's first mortgage, and Standard and Poor's have rated the Applicant's preferred stock AA (Petersen, Tr. following 546, pp. 1-7 and 1-8).

The weight of the evidence strongly supports a finding that the Applicant is financially qualified to design and construct the proposed Bailly facility. The Joint Intervenors failed to offer any substantial, probative evidence to the contrary.

F. *Applicant's Technical Qualifications*

30. The Applicant has had considerable experience in the design construction and operation of numerous fossil-fired power plants. Its principal contractors, General Electric Company and Sargent and Lundy, have extensive experience in the design and construction of nuclear power facilities (S.E.R., following Tr. 741, p. 126). The Applicant has taken steps to assure that individuals with relevant prior experience are assigned by such contractors to the Bailly nuclear project (Lyle, following Tr. 582). The proposed organization of NIPSCO's staff is modeled on the organization of project groups which have successfully managed the design and construction of nuclear power plants (Coe, following Tr. 584). The Regulatory Staff has concluded that the Applicant is technically qualified to design and construct the Bailly facility (S.E.R., pp. 126, 138).

31. The Joint Intervenors allege in Contention 21 that the Applicant has had no experience in the nuclear field and therefore the Commission cannot properly issue a

construction permit because NIPSCO is without the prerequisite experience. The Joint Intervenors did not direct the Board to any legal precedent in support of their contention.

Our independent search reveals a number of cases suggesting that prior nuclear experience is not required. Although these decisions do not have the finality of either a Commission or Appeal Board decision, nevertheless, we find them persuasive. *In the Matter of Northern States Power Company,* Docket No. 50-130, Intermediate Decision, 1 AEC Rep. 314 at 323 (April 21, 1960); *In the Matter of Niagara Mohawk Power Corporation,* Docket No. 50-220, Initial Decision, 3 AEC Rep. 5 at 14.

The approach suggested by the Joint Intervenors would bar substantially all public utilities from utilizing nuclear power, since this field is relatively new with few organizations knowledgeable in the intracies of nuclear power. We perceive no reason why experienced electrical utility operators should not be permitted to take advantage of such expertise in developing another source for production of electrical energy, provided that the Applicant develops a schedule of training for its own employees to enable the Applicant to properly operate a nuclear plant.

32. Accordingly, we reject the Joint Intervenors' Contention 21. We find that NIPSCO is technically qualified to design, construct and operate a nuclear power plant.

G. *Common Defense And Security*

33. We conclude that permiting NIPSCO to construct the proposed Bailly nuclear facility will not be inimical to the common defense and security of the nation.

All of Applicant's directors and principal officers are citizens and residents of the United States (Petersen, following Tr. 546, pp. 1-2; Appl. Ex. 1A, p. 2). All activities of the Bailly facility will be conducted within the jurisdic-

tion of the United States. No diversion of special nuclear material for military purposes is involved (S.E.R., p. 135). Applicant is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

H. *Health And Safety Of The Public*

Since Joint Intervenors' health and safety contentions are extensive and pervade the entire ambit of issues dealing with the health and safety of the public, we believe that our resolution of these contentions will be determinative of whether or not construction of the plant will be detrimental to the well-being of the public. Therefore, we will now scrutinize the matters raised by these contentions as we deem appropriate.

1. *Emergency Plans*

34. The Applicant has presented in Section 13.10 of the PSAR, as amended by Amendment 16 (Appl. Ex. 1E) a description of the emergency plans for use in the event of an accident involving the release of radioactive material to the environment. Joint Intervenors allege in Contention 19 that the emergency plan has not been sufficiently developed. Bethlehem also expressed concern regarding the Applicant's emergency plan insofar as it affected the Burns Harbor Plant of Bethlehem Steel. While Bethlehem was admitted as a party with regard to this concern (Order Permitting Intervention dated May 15, 1972), Bethlehem indicated on the record that it would prefer to work out the details of an emergency plan with NIPSCO separately from this proceeding if possible (Tr. 692). Nonetheless, the Safety Evaluation Report carefully assesses the emergency planning considerations for the Bethlehem facility.

35. Plans for the evacuation of the Bethlehem employees from the LPZ have been developed which would reduce the number of employees within the LPZ from a daylight maximum of 3,000 to 1,500 within two hours. Within the

next six hours, the work force would be reduced to an estimated 259. Twelve hours after the evacuation notice has been given, there will be approximately 168 Bethlehem employees within the LPZ, who comprise the emergency work force. Detailed procedures for the protection of these employees will be available when the FSAR is submitted (Dunn, following Tr. 640, p. 4-8; Appl. Ex. 1E, § 13.10.10). The dose calculation for these employees are well within the levels set forth in the Commission's guidelines for siting of facilities in 10 CFR Part 100 (S.E.R., Supp-1, p. 4).

In addition, the exclusion area has been restricted to an area totally within the boundaries of the Applicant's property at the site and is, therefore, under the control of the Applicant (Appl. Ex. 1B, p. 2.2-25). The LPZ contains no schools or hospitals (Appl. Ex. 1B, p. 2.2-35). Arrangements have been made with Federal and State governmental agencies having emergency responsibilities (Dunn, following Tr. 640, p. 4-2). Local hospitals have been contacted and have expressed their intent to cooperate in the development of offsite medical treatment of injured personnel (Dunn, following Tr. 640, p. 4-2; Tr. 652-53, 863-64). As to the National Lakeshore, the Assistant Secretary of the Interior gave his assurance that the Department would cooperate in the development of an appropriate evacuation plan if Bailly were licensed (Tr. 7586).

We are not persuaded by the indication that the Assistant Secretary of the Interior would find it objectionable if the Department was required to establish a methodology for evacuation beyond the scope of its normal duties of the National Park Service (Tr. 7562). The issue is whether or not Interior would cooperate. The Joint Intervenors have not introduced any conflicting testimony which specifically rules out such cooperation.

Moreover, the evidence fully supports the proposition that a satisfactory emergency plan can be developed for

the National Lakeshore (Maletskos, following Tr. 642, pp. 5-6; Tr. 669-71).

In view of the foregoing, we see no merit in Contention 19. Applicant's emergency plan satisfies the requirements of Appendix E to 10 CFR Part 50.

2. *Seismic Characteristics*

36. Intervenors contend that Bailly N-1 fails to comply with Criterion 2 of the General Design Criteria in that the seismic design of the facility is insufficient to withstand the impact of an earthquake such as occurred in 1971 in the San Fernando Valley, and that the geological data relied upon to establish seismic design are inadequate.

Intervenors called two qualified geologists to present testimony (see McKee, following Tr. 8265, and McCammon, following Tr. 8258). They did not claim that an earthquake as severe as the San Fernando Valley quake of 1971 was a reasonable possibility in the Bailly region. The thrust of their testimony was rather that at this time it is inappropriate because of the paucity of firm information to set limits for a design basis earthquake at Bailly site. Although this amounts to a revision of the contention, the Board felt the issue was of such importance that we should hear any evidence that might support such a conclusion.

37. The Bailly site is located on the edge of the Michigan basin near the Kankakee Arch. The geology of this Region is characterized by a sequence of about 4,000 feet of gently dipping Paleozoic age sedimentary rocks (270 to 600 million years old) overlying the Precambrian age basement complex (more than 600 million years old), which is composed of igneous and methamorphic rocks. Observation of these Pleistocene deposits, which characterize eastern Illinois, western Michigan, and northern Indiana, has produced no evidence of active faults. Those faults

indentified in northeastern Illinois and northern Indiana are classified as late Paleozoic to early Cretaceous (270 to 700 million years ago). There has been no evidence of movement within the past for well over 35,000 years (Leeds, Allen, Perry and Chauvin, following Tr. 2063; Tr. 2117-22, 6610, 6631-36, 6647-54).

38. The acceleration to be provided for in a design basis earthquake is, in large measure, determined by the distance to an active fault. Consequently, the Applicant's and Regulatory Staff's testimony to the effect that there were no active faults near Bailly was of crucial importance. (Leeds et al., follows Tr. 2063; Tr. 2114-16, 2124-32, 2154-60, 2063, 6630-32). Joint Intervenors' witness McKee (testimony following Tr. 8265) had studied the geology of the region extensively. She identified faults in the Chicago Area; however, she did not demonstrate that the faults were active. Indeed, the faults she identified were taken into consideration in defining the design basis earthquake (Leeds, following Tr. 9768).

Witness McKee further testified that even if all faults were inactive at present, they might be triggered by injection of waste into underground strata. She cited man-made earthquakes in the Denver Region that resulted from deep-well disposal operations. This was countered by Applicant's witness (Winar, following Tr. 9775, pp. 1-4) who pointed out that the geologic conditions in the Denver Region are entirely different from that in Northern Indiana. Further, the quakes were very small compared to the design basis earthquake. There have been no similar phenomena in the Chicago Region.

39. The evidence discloses that the calculated ground motion at the site would be well below that which is proposed for the design basis earthquake (Tr. 9777-78, 9814-15). All Class 1 structures at Bailly are being designed to meet an earthquake of intensity VII on the Modified Mercalli Scale of 1931. We share the view of Applicant's wit-

ness Leeds that this design criteria represents appropriate conservatism (Leeds, *et al.*, following Tr. 2063, pp. R-56-7 and -8). The acceleration selected by the Applicant is more than twice the level of what could reasonably be postulated in accordance with AEC criteria and represents a conservative estimate based on pertinent earthquake experience (Tr. 2096, 2101-2, 6646-48). The safe shutdown earthquake assumes 20% of g for the horizontal component and 13.34% of g for the vertical component. The comparable figures for the operating basis earthquake are 10% and 6.67% (Tr. 2136-38).

40. Our consideration and the testimony in this proceeding with respect to seismology and geology reflect the proposed Appendix A to 10 CFR Part 100 which had been available for guidance since its publication by the Commission on November 25, 1971 (36 F.R. 22601). On November 13, 1973, the Commission adopted Appendix A, in final form, to become effective December 13, 1973 (38 F.R. 31279).

41. In its adoption of the final Appendix A, the Commission described all of the significant differences between the proposed and the adopted versions (38 F.R. 31279-81). Many of the revisions simply reflect refinements in verbiage and editorial improvements (*e.g.*, the term "active fault" has been renamed "capable fault," but the definition and application of the terms are essentially identical in both versions of Appendix A), while others pertain to matters not pertinent to the Bailly site (*e.g.*, consideration is now required "of the loading effects of dams or reservoirs in the determination of soil stability"; there are no dams or reservoirs in the vicinity of Bailly). All pertinent substantive revisions are satisfied by the seismic and geologic information submitted. For example, the Commission identified three major changes at 38 F.R. 31279. With regard to the first major change, the Applicant has defined the Safe Shutdown Earthquake and Operating Basis Earthquake in terms of geology and seismology, as well as in terms of the effect of these earthquakes on plant structures (Appl. Ex. 1B, § 2.5.3 and Appl. Ex. 1E § 12.2). With regard to the second major change, the Applicant's witnesses on seismology have satisfactorily addressed the matter of three-dimensional investigation, including information obtained in offshore geologic surveys in Lake Michigan (Leeds, *et al.*, following Tr. 2063, pp. R-56-5 and -6; Tr. 6635-36). With regard to the third major change, the Applicant has selected an Operating Basis Earthquake and applied same to safety-related portions of the Bailly nuclear facility (Appl. Ex. 1B, § 2.5.3.5.1; Appl. Ex. 1E, §§ 12.1, 12.2).

42. We conclude that Applicant has complied with Appendix A to 10 CFR Part 100 both as originally proposed and as finally adopted by the Commission.

3. *Tornado Design*

43. Intervenors contend that the design of the Applicant's plant fails to comply with Criterion 2 of the Commission's General Design Criteria with specific reference to tornado design. Specifically, the Joint Intervenors contend that inappropriate meteorological data were used to determine the likelihood of tornadoes at the plant site; that in the event of a severe tornado the spent fuel pool would be exposed and the water would be sucked out of the pool leading to a loss of coolant and shielding and subsequently leading to a release of radioactivity that would endanger the public health and safety.

44. The design basis tornado for this facility consists of the assumption of the simultaneous application of a 300 MPH rotational wind velocity, a 60 MPH translational wind velocity and a 3 psia pressure drop in 3 seconds (Holtzscher and Williams, following Tr. 2175; Butler and Markee, following Tr. 5830; S.E.R., p. 64; Appl. Ex. 1C.2.3-7 and 1E, p. 12.2-3). There have been no reported tornadoes

that reached or exceeded the values selected. In fact, the highest value reported in the GE topical report "Tornado Protection for the Spent Fuel Storage Pool (APED 5696)" (Appl. Ex. 7) was 230 MPH rotational, with an average translational speed of about 35 MPH (Tr. 2193-94, 2196-97, 2199, 2202, 2237-38, 2265-67). The Applicant's expert witness, a co-author of APED 5696, concluded that the tornado values selected are conservative (Tr. 2193, 2202-03). The Staff indicated that the selected conditions are the worst that can be reasonably encountered at any site (Butler and Markee, following Tr. 5830), and that the probability of such a tornado occurring at the Bailly site was, while low, was nevertheless possible (Tr. 5858). Both the Staff and the Applicant concluded that the facility complied with the requirements of Criteria 2 of the General Design Criteria (S.E.R., pp. 64, 131; Holtzscher and Williams, following Tr. 2175). Intervenors offered no evidence on this part of the contention.

45. With respect to that part of the Joint Intervenors' contention that in the event of a tornado, the spent fuel pool would be exposed, the Applicant testified that a maximum of only about 11.4 feet of water could be removed and, moreover, "over 13 feet of water would still cover the fuel racks, which is more than adequate to cool the spent fuel." (Holtzscher and Williams, following Tr. 2175, p. R-57). The Staff's witness, Dr. Butler, provided testimony that was in substantial agreement with the Applicant's testimony with respect to the amount of water that could be sucked out of the spent fuel pool by a tornado, however, remote the likelihood of that event may be (Tr. 5835). He concluded that the water remaining in the pool will be sufficient to provide necessary cooling and shielding of the fuel (Tr. 5836). Dispersal of the water removed from the spent fuel pool would not endanger public health and safety (Tr. 5838-5840, 5850-5851, 5853-5856).

46. It is also possible that tornadic forces might damage and remove the metal siding panels located on the top

portion of the reactor building above the surface of the spent fuel pool. Damage such as this will not affect the safe shutdown and maintenance of the safe shutdown condition for the reactor (Holtzscher and Williams, following Tr. 2175; Tr. 2206-2209, 5845-5850).

47. The Board finds that the tornado design criteria for the Bailly facility are conservative and that, with respect to protection against tornadoes, the proposed Bailly nuclear facility design basis complies with Criterion 2 of the General Design Criteria.

4. *Post-LOCA Hydrogen Control*

48. Intervenors contend that the engineered safeguard systems of the Bailly nuclear facility are insufficient to avoid the generation of quantities of hydrogen within the containment after a loss-of-coolant accident that would require immediate venting of the hydrogen in order to avoid an explosive rupture of the containment.

49. There are two primary potential sources of hydrogen in a boiling water reactor following a postulated LOCA: (1) The metal-water reaction of zircaloy cladding with coolant during the post-LOCA fuel cladding temperature transient; (2) Radiolytic decomposition of the emergency core cooling water exposed to the decay energy of fission products (Wattelet and Davis, following Tr. 557, p. 2-1).

The concentration of hydrogen in the containment atmosphere following postulated accidents must be controlled to satisfy the requirements that containment integrity is maintained. The Applicant has committed to provide necessary systems to meet the requirements of Safety Guide 7, which describes a method of implementing this criterion which is accepted by the Regulatory Staff (S.E.R., p. 85; Wattelet and Davis, following Tr. 557, pp. 2-5).

50. Testimony of the Regulatory Staff and Applicant demonstrate that the provisions of Safety Guide 7 are conservative not only as to design requirements but also as to the assumptions which must be used to establish the design requirements (Tr. 771). For example, the Regulatory Staff witness testified that the G value of .5 molecules/100 ev is the highest value the Staff has ever noted in any test conducted. Usually the amount of hydrogen generated by radiolytic decompositions is only a fraction of this value. The metal water reaction of 5% is higher than that expected or seen in tests (Tr. 773), and, in fact, is higher than that computed to assure compliance with the Interim Acceptance Criteria for the ECCS system. Compliance with the provisions of Safety Guide 7 adequately controls the concentration of hydrogen following a LOCA and will assure that containment integrity is maintained. The Applicant has committed itself to comply with the requirements of Safety Guide 7 in the design of containment protection for the facility.

51. The Board finds that the design criteria for the facility, in accordance with the provisions of the Safety Guide 7, is adequate to assure that hydrogen generation after a LOCA will not require a venting of the hydrogen to avoid an explosive rupture of the containment and provides for adequate control of hydrogen concentration in containment following a loss of coolant accident to assure that containment integrity is maintained.

5. *Post-LOCA Radioiodine Control*

52. Joint Intervenors contend that engineered safeguard systems in the Bailly reactor for controlling radioiodine in the event of an accident do not assure that the levels of radioiodine that would be released can meet the guidelines set forth in TID-14844 and the limits set forth in 10 CFR Part 100.

53. Analyses of the offsite radioiodine doses in the event of a design basis accident were made by Applicant and the Regulatory Staff on the basis of the conservative assumptions of iodine release from the core in Safety Guide 3 (Jason and Dougherty, following Tr. 606; S.E.R., p. 113). In order to meet the requirements of 10 CFR Part 100 using these assumptions, the Applicant has proposed an engineered safeguard system for the purpose of controlling the release of radioactive iodine following a loss-of-coolant accident (Jason and Dougherty, following Tr. 606). This system includes the primary containment system which limits the rate at which iodine can escape into the reactor building. In addition, the atmosphere in the reactor building is circulated through the Standby Gas Treatment System, consisting of two redundant gas process systems, each of which has the capacity to process 100% of the required containment volume without the aid of the other (S.E.R., pp. 86-87; PSAR, Sec. 5.3). The Applicant proposes to use a new type of iodine filter design in the SGTS for Bailly. The iodine filters for Bailly would have two 8-inch deep beds of impregnated activated carbon, in series and would be a gasketless, weld seam construction. The deeper beds increase iodine residence time and improve removal efficiency. The gasketless design prevents leakage from bypassing the charcoal beds (Jason and Dougherty follows Tr. 606; Tr. 828). Applicant has indicated that the filter efficiency of each filter will be not less than 99%, as compared to a maximum removal efficiency of about 95% for earlier style filters (S.E.R., p. 87). The Staff has evaluated the proposed design and concludes that it is acceptable for the efficiencies proposed (S.E.R., p. 87). This is supported by testimony of Staff witness Zavodowski (Tr. 816-842) and test data (Appl. Ex. 3A, 3B, 3C, 4; Staff Ex. 2 and 3).

54. The Board finds that the engineered safety system proposed for the Bailly facility will adequately control radioiodine releases to assure that such releases in the

event of a design basis accident at the facility will not exceed the guidelines set forth in 10 CFR Part 100. The Joint Intervenors' contention is not supported by the weight of the evidence.

6. *Pressure Vessel Integrity—Major Weld Cracking*

55. Intervenors originally contended that due to weld cracking problems in the fabrication of other boiling water reactor vessels, special considerations existed which required analyzing the failure of the reactor pressure vessel for the Bailly facility. After considerable development of this contention in the prehearing process, the Board admitted this contention but stated:

> "In approving this specific contention, the Board intended that evidence thereon would be restricted solely to the question of major weld cracking and their effects on a finding of reasonable assurance that the Bailly pressure vessel will be constructed in conformity with the applicable regulations. Moreover, we also intended that in regard to this contention, no evidence would be received on the environmental effects of a pressure vessel failure." [11]

56. The reactor pressure vessel for the Bailly nuclear generating station is being manufactured by Combustion Engineering at its facility in Chattanooga, Tennessee (Carlisle and Vassar, following Tr. 1884). Both Applicant and Staff witnesses testified that the Bailly reactor pressure vessel is being manufactured in accordance with Section III of the ASME Boiler and Pressure Vessel Code (Carlisle and Vassar, following Tr. 1884 and S.E.R., p. 30). There was extensive testimony concerning the welding and examination and testing requirements of the ASME Code.

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[11] "Ruling on Applicant's Petition for Reconsideration of Board's Action on Contentions at Prehearing Conference of March 9, 1973" (dated April 3, 1973, p. 2).

These vessels are also subject to ASME Section XI inspection requirements. For this vessel preservice baseline examination will employ ultrasonic techniques (Carlisle and Vassar, following Tr. 1884, p. R-49-2).

57. With respect to welding performed on the pressure vessel by the Combustion Engineering Company, the details of the welding procedures have been reviewed over a period of several years, by a number of AEC inspectors. These procedures have been found to be in conformance with Code requirements (Tr. 5074), and there has been no evidence of rejectable weld defects in the work performed. Applicant also presented evidence to the same effect (Carlisle and Vassar, following Tr. 1884).

58. In support of their contention, the Joint Intervenors called Lawrence Bieker, a licensed structural engineer (Bieker, following Tr. 8584, p. 1). He has many years of experience in pressure vessel welding, but not with the large, thick-walled reactor or pressure vessels (Tr. 8586-8589). Mr. Bieker's testimony, and Joint Intervenors' Exhibits 5, 6, and 28, pointed out that there had been problems in reactor pressure vessel fabrication, chiefly with the Hatch vessel. No evidence was presented that would indicate that the Bailly vessel would encounter similar problems.

Mr. Bieker, at Tr. 8607, discussed the difficulties with certain small weld grooves, but the Applicant later testified that the weld groove configuration described by the witness would not be involved in the fabrication of Bailly N-1 (Carlisle, following Tr. 10001, p. 2). Mr. Bieker claimed that welds in the Bailly pressure vessel could be repaired without the approval of independent quality control personnel (Tr. 8594, p. 3). Applicant's witness Carlisle testified that after a weld is repaired, it is subject to the same quality assurance examination as any other weld in the pressure vessel (Tr. 10003-05). Intervenors' witness Bieker also testified concerning an alleged design

defect due to stub tubes in the bottom head assembly being welded without subsequent machining to eliminate distortion (Bieker, following Tr. 8584, p. 2). He admitted that the problem would be eliminated if the machining were done after the welding (Tr. 8619-20). Applicant's witness Carlisle testified that, in fact, the machining will be done subsequent to the welding (Carlisle, following Tr. 10001, p. 3; Tr. 10009-13).

59. Joint Intervenors' Exhibit 7 indicates a manufacturing deviation in the welding of the Bailly vessel, namely, inadequate preheat. The Applicant testified that on several occasions involving a small percentage of the welding performed on the Bailly vessel, the preheat fell below the 300° required by General Electric and that this was reported in accordance with established procedures (Carlisle and Vassar, following Tr. 1884, pp. R-49-4 and -5; Tr. 1947-56). This was not a violation of ASME Section III, but, nevertheless, a special ultrasonic and radiograph examination of the subject area will be made (Carlisle and Vassar, following Tr. 1884, pp. R-49-4 and -5).

60. The Board finds that there is reasonable assurance that the Bailly vessel will be completed in accordance with the ASME Code and will be free of major welding defects, and that there is no evidence of any special consideration concerning the integrity of the Bailly pressure vessel.

7. Anticipated Transients Without Scram (ATWS)—Common Mode Failures And The REVAB System

61. The Joint Intervenors contend that as a result of a common mode failure, the reactor may fail to scram when challenged. Further, the failure to scram on some transients that can be anticipated within the life of the power plant can lead to unacceptable consequences. It is the position of the Applicant and Regulatory Staff that the probability of failure to scram is very small. In addition, they claim that the Bailly facility can survive an ATWS event since a trip of the recirculation pumps is provided as a back-up to the scram.

Protection against such common mode failures is provided by functional diversity in the use of different plant variables; physical diversity in the separation of safety related instrumentation and components; quality assurance in the review of design and testing of instrument components, and operational administrative measures including checking of maintenance or repair work, and accessibility of instrument settings and calibration controls (Appl. Ex. 8; Tr. 2594-2723, 4772-4812). The Regulatory Staff concluded that Applicant's design against common mode failures is acceptable (Tr. 6362) in view of the additional protection provided by recirculation pump trip.

62. After carefully reviewing the evidence, we conclude the position of the Joint Intervenors on common mode failures has not been sustained.

63. As part of Contention 51, the Joint Intervenors assert that the Applicant's use of the REVAB system would impose duties on the relief valves beyond their duty to protect the primary system's integrity.

There are 10 safety/relief valves on the main steam lines inside the primary containment to provide the protection against primary system over-pressure. The operation of these valves with the REVAB system permits the reactor to accommodate a loss of load without reactor scram (Benaroya, Tr. 1628-1658; Davis, following Tr. 2617; S.E.R., p. 37). The added function of the REVAB to these valves would not adversely affect the safety function of these valves (Benaroya, Tr. 1629-1632; Davis, following Tr. 2617). The Regulatory Staff concluded that Bailly's REVAB system was acceptable (Tr. 1634-1635; Tr. 1676-1677).

Intervenors' witness was concerned that a sustained continued release through the REVAB system might raise suppression pool temperature such that the ECCS would not adequately cool the core in the event of a LOCA (Jackson, following Tr. 9340). This area was previously pursued by Board inquiry (Tr. 1682-1684). The Staff indicated that the operating technical specifications would include a limitation on pool temperature, presently considered at about 125°F, which would require shutdown of the facility (Tr. 1688); thus, assuring that a failure to close REVAB valves would not affect the ability of the ECCS to perform in the event of a LOCA (Tr. 1688).

64. As to ATWS, the Staff has recently summarized their position in Staff Exhibit 11 (WASH-1270). They conclude that nuclear plants must either provide diverse protection systems which make failure to scram much less likely, or provision must be made for mitigating the consequences of a failure to scram on anticipated transients. The proposed Bailly design includes provision for tripping the recirculation pumps in the ATWS event (Davis, following Tr. 2001, p. R-50-1), as a means of complying with WASH-1270. The signal for tripping the recirculation pumps will be completely separate from the scram signals (Appl. Ex. 1L; S.E.R., p. 135). Recirculation pump trip and the attendant reduction in reactivity due to bubble boiling restoration in the core should enable the reactor to survive the transient long enough for the liquid from poison to be injected into the core, thereby reducing the reactivity below zero and shutting down the plant.

65. Summarizing, the Board is satisfied that adequate provisions will be incorporated in the design of the Bailly nuclear facility to assure adequate protection against the effects of common mode failures and anticipated transients without scram.

8. *Decay Heat And Containment Pressure*

66. The crux of the Joint Intervenors' contention is that, " . . . the maximum pressure peak in the dry well and pressure suppression chamber will exceed the design limit . . ." because the Applicant has failed to include all the available energy sources in its analysis of the peak containment pressure. They cite as their example the fact that decay heat was computed by use of ANS 5.1 which ignores certain key factors in computing the decay heat component of the total energy.

67. There are four principal sources of energy that contribute to peak containment pressure following a LOCA and decay heat is the least of the four (Tr. 5868, 5891-5902, 5907-5908). The fraction of total energy contributed by decay heat is very small. It is so small that any uncertainty as to its quantity would have a negligible effect in determining the maximum pressure in the containment following a loss-of-coolant accident (Tr. 2283, 5869). The evidence also showed that the peak pressure in the dry well is governed more by (1) the rate of coolant blowdown [the rate of energy removal from the reactor vessel], and (2) the rate of energy transferred from the dry well to the wet well (Tr. 5893).

68. Both the Regulatory Staff and the Applicant presented evidence that the calculated containment peak pressure is 37 psig, whereas the design pressure is 45 psig (S.E.R., p. 53; Dunn and Davis, following Tr. 2282, p. R-52-2). This design margin is adequately conservative (S.E.R,. p. 53, adopted by Dr. Butler as his testimony, Tr. 5881).

69. The thrust of the testimony of M. R. Jackson, Joint Intervenors' witness, is that uncertainty exists in the calculations for primary containment peak pressure during a major LOCA because the calculations were based on models and were unsupported by experimental verification (Jackson, following Tr. 9340, pp. 6-7). Mr. Jackson's conclusion

was based on his assertions that: (1) the steam, which will flow from the dry well into the wet well via the vent pipes following a LOCA, will not be completely condensed, and (2) his reliance on Rockwell's testimony that there has been no full-scale prototype blowdown test of the Bailly containment and suppression chamber (Tr. 10668). The witness was not aware of experimental data having been taken of simulated LOCA conditions with an 18-inch diameter break venting fluid at the rate of 43,000 pounds per hour and had no knowledge of tests which used a 24-inch diameter downcomer into the suppression pool. He agreed that if there were information showing the same volume flow rate through a 24-inch diameter downcomer it would well completely eliminate any scale-up factor (Tr. 9357). In rebuttal, Dr. Butler of the Regulatory Staff testified that experimental data taken on a full scale, 1/48 segment of the Humboldt Bay containment and 1/112 segment of the Bodega Bay containment, served as the basis for concluding that there will be complete condensation of the steam which passes through the vent pipes into the suppression pool water (Butler, following Tr. 10253, p. 1). Further experimental data is contained in Board Exhibit 6, non-proprietary portions of GE Topical Report, NEDE-10182, dated May 1970, selected by Joint Intervenors from a document supplied by the Staff, and received without objection. Mr. Jackson also asserted that Fauske data revealed that Applicant's blowdown flow model was nonconservative (Jackson, following Tr. 9340). Applicant's evidence rebutted this assertion showing that the model used, in fact, accurately predicts the Fauske data (Rockwell, following Tr. 10636).

70. In view of the foregoing, the Board concludes that total energy sources have been appropriately taken into account in calculating the peak pressure following a LOCA and that the containment design pressure contains an adequate margin of safety.

9. *In-Core Instrumentation*

71. The uncontroverted evidence is that the system provides sufficiently rapid measurement of the local power densities so that if safety related actions need to be taken either by the automatic systems or the manual system, such action can be taken in time to prevent any of the full damage limits being exceeded (Tr. 5116). Furthermore, the power oscillations are adequately suppressed (Tr. 5118-19, 5129). Intervenors presented no contradictory evidence on this contention.

The Board concludes that the in-core monitoring system is satisfactory and complies with the requirement of the General Design Criteria.

10. *Restraints Against Pipe Whipping*

72. Intervenors contend that the design of Bailly N-1 fails to comply with Criterion 4 of the General Design Criteria because adequate restraint against pipe whipping of the primary cooling pipe has not been provided.

73. The Bailly nuclear facility is in the construction permit stage of licensing and final design details are not available. Since pipe routing has not been finalized, restraints against pipe whipping cannot be finalized (Tr. 2416). Although the pipe whip protection has not yet been designed, criteria has been established in the form of identification of piping systems for which pipe whip protection must be provided, identification of the technique to be used for the particular piping systems (e.g., restraints, check valve near vessel, separation), identification of the degree of whipping permitted (e.g., none, limited area), and a prohibition against damage to essential systems and components (Appl. Ex. 1F; S.E.R., pp. 39, 40; Benaroya, following Tr. 1471, p. 1-2). In a letter dated December 21, 1972 (supplemented on January 15, 1973), the Staff provided detailed guidance to the Applicant on methods of analysis of pipe whip for high energy lines

outside containment (Reg. Staff Ex. 4). The Applicant has agreed to comply with these Design Criteria (Tr. 1540, 2425-2426).

74. A piping system designed to the Applicant's pipe whip criteria will satisfy General Design Criterion 4, with respect to pipe whip. The Applicant must complete his design in accordance with those criteria and submit the completed designs for such protection for the Regulatory Staff's review as a part of the final safety analysis report along with the design details of the other important safety and protection systems and components. The evidence shows that Applicant will be able to satisfy these requirements (Branch, following Tr. 2416; Appl. Ex. 1C; Tr. 1490-1492).

75. The Joint Intervenors presented no evidence on this contention. The Board finds that the Applicant will be able to submit a detailed design of piping systems to meet the criteria to which it has committed itself, and that such criteria satisfy the requirements of General Design Criterion 4.

11. *Reliability Of Containment Isolation Valves*

76. Intervenors contend that the design of the Applicant's plant fails to comply with Criterion 54 of the General Design Criteria because there is no assurance that the containment isolation valves of the Applicant's plant will be sufficiently reliable to effect isolation of the containment in the event of an accident in view of the record of isolation valves sticking open on other operating reactors.

77. There have been some instances in which main steam line isolation valves have failed to close properly. These instances have been investigated and corrective actions taken (Davis and Kuhlman, following Tr. 2433; Tr. 1610, 2439-46, 2449-50). As a result of past experience, the

Bailly valves were selected so as to provide extra assurance of satisfactory operation (Davis and Kuhlman, following Tr. 2433).

78. Intervenors introduced a Staff memorandum (Joint Intervenors' Ex. 1) concerning an incident at Oyster Creek involving the failure of a relief valve to close, causing primary system blowdown after a reactor scram. During this event, one of the main steam line isolation valves failed to close. Even in this instance, isolation of the reactor was accomplished by proper operation of the redundant main steam line isolation valve (Joint Intervenors' Ex. 1; Tr. 1586-1588).

79. The Bailly facility is provided with redundant MSIV's. The probability of two MSIV's in series failing is close to very low. Although not impossible, such failure has not, in fact, occurred (Tr. 1599, 1608). The electrical system for the valves in each line are redundant, and meet the requirements of IEEE-279. There are a number of signals for valve closure generated through the isolation control system and the inner and outer valves are controlled by different systems (Tr. 1617-18, 2457-58, 2465-67, 2480-81). To provide further protection against the possibility of leakage past both valves if both valves close but some leakage exists, or even if one MSIV failed to close, the Applicant will install a sealing system in connection with these valves. Although such system has not yet been designed, a number of methods are feasible. When the design of such a system is selected, it will be submitted to the Commission for review (Tr. 1600-06, 2435, 7772-74).

80. The Applicant has provided preliminary information with respect to inspection and testing of the MSIV's (Appl. Ex. 1C, 1F), and the details of such a program will be presented in the FSAR (Davis and Kuhlman, following Tr. 2433, pp. R-59-2 and -3). The operating technical specifications will impose requirements for testing, which would normally be done weekly (Benaroya, following Tr. 1568;

Davis and Kuhlman, following Tr. 2433, pp. R-59-2 and -3; Tr. 1607-08, 2437-39, 2447-49).

81. We conclude that the steps being taken by the Applicant including the utilization of redundant valves, the addition of a sealing system to the MSIV's, the types of valves selected, and the proposed test program, provide assurance that there will not be a failure of the isolation valves to close when required and to effect isolation of the containment and that the requirements of Criterion 54 will be satisfied. The contention is rejected.

12. *Control Rods*

82. Joint Intervenors have alleged in Contention 60 that the N-1 design fails to comply with General Design Criterion 25 in that the design of the control rods and control rod drive mechanisms is such that stuck rods, misaligned rods, and failure to scram are highly credible events which the Applicant has failed to analyze in depth. Criterion 25 deals with protective system requirements for reactivity control malfunctions. It requires that the protection system be designed to assure that specified acceptable fuel design limits are not exceeded for any single malfunction of the reactivity control system.

83. The control rod system has been described in detail (Appl. Ex. 1B (PSAR), Secs. 3.4, 3.5). They are standard GE designs which are similar to those used in previous BWR reactors going back to Oyster Creek. Possible malfunctions including continuous rod withdrawal and malfunctions due to stuck and misaligned rods were described along with designs and requirements to prevent such malfunction or to protect fuel limits in the event of malfunction (Davis, following Tr. 2535; Tr. 5191-5232).

84. Rod withdrawal of the maximum worth rod from any normal pattern would not result in damage, and withdrawal from abnormal patterns is prevented by rod block

monitors (Davis, following Tr. 2535, p. R-60-2). The potential for stuck rods is minimized by observation of in-core monitor readings and position indicator switches, careful quality control testing, and weekly surveillance requirements (Butler, following Tr. 5191). Tests have been run with misalignment more than twice the tolerance limits without significantly affecting scram performance (Davis, following Tr. 2535).

85. No evidence was supplied by the Joint Intervenors that "stuck rods, misaligned rods, and failure to scram are highly credible events." The Board finds that the control rod drive mechanisms will comply with Criterion 25.

86. Although the matter is not related to Criterion 25, the Board inquired into the design basis rod drop accident (Tr. 1159). The Staff reassessed this postulated accident as described in Supp. 1 to the Safety Evaluation Report (following Tr. 741), and now requires that systems be provided which will limit the maximum energy yield of such an accident to less than 280 calories per gram. The Applicant will install a system to provide the required assurance, which will be similar to the hard-wired rod sequence control system recently required for other GE plants at the operating license stage (S.E.R., Supp. 1; Tr. 2536-39). Such a system would adequately prevent or mitigate the consequence of the design basis rod drop accident. The design details of the system and any related design modification can reasonably be implemented during final design of the Bailly facility.

13. *Fuel Densification*

87. The Joint Intervenors assert that operation of the proposed Bailly reactor will be endangered by densification of the reactor fuel.

The record supports the conclusion that fuel densification would not adversely affect the ability of Bailly to operate with adequate safety (Appl. Ex. 27; S.E.R. Supp.

2, following Tr. 9826, pp. 10 and 11; Tr. 9744). The Applicant has proposed limitations on the linear heat generation rate which comply with the Regulatory Staff's conclusions (Tr. 9744).

88. The Board finds that the public health and safety would not be endangered by densification of reactor fuel in the operation of the Bailly facility under the proposed limitations of the Regulatory Staff and the Applicant.

14. *Ground Water Contamination*

89. Joint Intervenors' Contention 55 alleges that radioactivity from normal, abnormal, or emergency operations of Bailly N-1 may contaminate the ground water and ultimately the civilian and potable water supplies, including Lake Michigan, thereby endangering the health and safety of the local public. The contention has two aspects: first, Joint Intervenors challenge the validity of the conclusions concerning ground water flow to Lake Michigan; second, the contention involves assessment of the impact of possible spills.

90. On the basis of a number of studies, including borings at the site (Appl. Ex. 1B, 1E, 6), Applicant's hydrologist concluded that the ground water gradient is to the north toward Lake Michigan and that there is only the possibility of a small gradient developing to the west (Dougherty and Annambhotla, following Tr. 2321). Later investigations were introduced to confirm the conclusion that ground water movement at the site was northward (Appl. Ex. 29). The Staff hydrologist Mr. Hulman also testified that the flow pattern of the ground water is clearly in a northerly direction into Lake Michigan (Hulman, following Tr. 1444, admitted at Tr. 5139).

91. Joint Intervenors' witness Mr. Hilty testified that ground water might flow east into Cowles Bog, on the basis of some data collected off site and from observation of

surface water flows (Hilty, following Tr. 8658; Tr. 8663, 8705). He recognized that the data were limited, and he had made no determination that ground water at this location flowed in the same direction as surface water (Tr. 8663, 8671, 8686, 8702). He indicated his belief that there was not a good hydraulic connection between Lake Michigan and the site (Hilty, following Tr. 8658; Tr. 8770). This testimony was rebutted by evidence of a good hydraulic connection between Lake Michigan and the site, based on borings showing a continuous stratum of sand from the site to Lake Michigan (Annambhotla and Brissette, following Tr. 10334; Tr. 10354, 10357-10359).

92. The record demonstrates sufficient investigation and evidence concerning ground water flows to establish that the ground water flow gradient is to the north toward Lake Michigan and to enable conservative estimates of ground water flow to be made (Dougherty and Annambhotla, following Tr. 2321; Hulman, following Tr. 5140).

93. With respect to the other aspect of this contention, possible sources of liquid contaminants considered were: (1) service water, (2) cooling tower blowdown, (3) processed liquid wastes, (4) makeup demineralizers, (5) sewage treatment plant effluents, and (6) liquids resulting from radwaste accidents (Dougherty and Annambhotla, following Tr. 2321). The makeup demineralizers and the sewage treatment plant effluents are kept physically separate from potentially radioactive liquids and, therefore, cannot become sources of radioactivity (Dougherty and Annambhotla, following Tr. 2321). The service water system and cooling tower blowdown and processed liquid wastes will be monitored carefully to assure that radioactivity contained in liquid effluents will not contain concentrations in excess of 10 CFR Part 20, and, in fact, will comply with the limitations set forth in Proposed Appendix I to 10 CFR Part 50 (Dougherty and Annambhotla, following Tr. 2321, p. R-55-3).

94. The remaining source of possible liquid contamination is an accidental spill in the liquid radwaste system. Applicant's analysis of a possible worst case spill showed that the concentrations of radioactive materials reaching the Lake would be a small percent of the values contained in 10 CFR Part 20, Appendix B (Dougherty and Annambhotla, followig Tr. 2321; Tr. 2350-2353, 2376-2406). The Staff undertook an independent assessment on the basis of more conservative worst case assumptions. Even under these assumptions the release of radioactivity into the lake of all isotopes would be less than the concentration values in 10 CFR Part 20, Appendix B, Table II, at the point of admixture with the Lake, without regard for dilution in the main body of the Lake (Lynch, following Tr. 10305; Butler, Tr. 10312). The postulated conditions would occur for only a few hours and are not averaged over an entire year, so the postulated exposures involved would be quite small (Tr. 10312), and the possibility of such a major spill of the contents of a large radwaste tank is very unlikely (Tr. 10313-10321).

95. The Board finds that there has been adequate investigations of ground water to establish the direction of flow and conservative estimates of the amounts of such flows. The Board also finds that, based upon such information and the very conservative estimates of possible spills, there is reasonable assurance that public health and safety will not be endangered by contamination of civilian and potable sources.

15. *Quality Assurance*

96. Notwithstanding the fact that quality assurance in general was not raised as an issue by the Joint Intervenors, the Board in this proceeding has considered very carefully the Applicant's quality assurance program for the purpose of determining whether it would be in public interest to grant the Applicant a construction permit.

97. The Quality Assurance (QA) program for the Bailly facility involves the Applicant, General Electric (the NSSS supplier), Sargent & Lundy (the architect-engineer), and C. F. Braun (the construction manager). (Appl. Ex. 1F, p. D. 1-2; Lyle, following Tr. 582, p. 36; Carlisle, following Tr. 9590, p. 1). The areas of responsibility for each organization are identified in the PSAR (Appl. Ex. 1F, p. D. 2-6), but the Applicant maintains full responsibility for quality assurance for the Bailly facility (Carlisle, following Tr. 9590). The Applicant will have a QA staff of 8-10 persons assigned to the project. In addition, the United States Testing Company serves as Applicant's QA consultant (Lyle, following Tr. 582, pp. 39-40; Carlisle, following Tr. 9590). The organizational structure is discussed further below.

98. Applicant's QA manual gives a detailed explanation of the manner of implementation of each of the Criteria of Appendix B to Part 50 (Appl. Ex. 26, Secs. 1-18). The remainder of the manual consists of Appendices A through D which give further detailed explanations of certain of the criteria such as organizational charts, responsibility charts, essential components lists, and QA procedure lists. This manual requires safety essential components and services be furnished by qualified vendors and contractors. Each vendor or contractor must have a documented quality program which is reviewed and approved by Applicant and must submit its procedures to Applicant for review. The program also requires vendors and contractors to establish with Applicant a notification program whereby Applicant is notified of specific QA activities so it may be represented at these activities. The manual references detail procedures for activities to be performed directly by NIPSCO (e.g., review of vendor's QA manual). These procedures described explicit rules to be followed and documentation required in performing that activity. All audit and surveillance activities are performed in accordance with a written plan. Any nonconformance iden-

tified is documented and must be resolved to the satisfaction of Applicant's QA supervisor (Carlisle, following Tr. 9590).

99. The Regulatory Staff has conducted a number of reviews of Applicant's quality assurance program. Staff witnesses on this matter were the inspectors responsible who have conducted the on-site review of Applicant's quality assurance program and have audited implementation of the quality assurance program requirements for procurement activities for the Bailly facility (Vandel, following Tr. 9649; Sutton, following Tr. 9652). During the course of these inspections, various deficiencies were identified and brought to the attention of the Applicant, and have been corrected by Applicant, including one violation involving the lifting of certain components with a crane in the absence of written procedures for such activities. Satisfactory procedures have been provided by the Applicant.

100. The Staff has concluded that the QA program for the Bailly station meets the requirements of 10 CFR Part 50, Appendix B and the commitments reflected in the PSAR (Tr. 9649, 9652). See Regulatory Staff's "Motion For Leave To Amend Staff's Proposed Findings Of Fact And Conclusions Of Law Dated February 1, 1974," filed February 14, 1974. See Tr. 5-6 of Oral Argument on Proposed Findings, February 19, 1974.

101. The Applicant's organization provides for a QA staff which is separate from the nuclear staff and reports directly to top management (Lyle, following Tr. 582, p. 39; Coe, following Tr. 584, p. 7-4). The Applicant submitted an undated organizational chart more clearly establishing the independence of the QA organization of the Applicant (Appl. Ex. 28). The Board requested clarification of whether a certain unexplained relationship between the Executive Manager and the Manager of the Fossil Plant Engineering compromised the clear separation of reporting

lines of authority between the Bailly Nuclear Staff and the Bailly N-1 QA Staff. This limited nonreporting relationship was satisfactorily explained and does not compromise the clear separation of these organizations. The merger of reporting lines between the Nuclear Staff and the QA Staff is at top corporate management level, the Vice President or those acting in his absence.

We conclude that the Applicant's QA organization is provided with sufficient independence to comply with 10 CFR Part 50, Appendix B. Support for this finding is contained in *Commonwealth Edison Company (LaSalle County Nuclear Station, Units 1 and 2)*, Commission Memorandum and Order, CLI-73-32, RAI-73-12 1072 (December 7, 1973).

102. In view of the foregoing findings, the Board concludes that the issues raised during the health and safety phase of this proceeding pose no barrier to the granting of a construction permit to the Applicant. Issuance of such permit will not be inimical to the health and safety of the public.

III. Findings on Environmental Matters

103. The location of the proposed facility on the shore of Lake Michigan to the north and bounded on the east by the Indiana Dunes National Lakeshore is characterized by its proximity to an environment of special qualities.

The Indiana Dunes region includes an exceptional combination of sand dunes, marshes, swamps and bogs, white sand beaches, and diversified flora and fauna—a natural area difficult to equal anywhere in the Nation. That portion of the Indiana Dunes National Lakeshore adjacent to the Bailly site and consisting of some 1200 acres is one of the best remaining areas in the Indiana Dunes. Starting at the edge of Lake Michigan and proceeding inland, it contains a cross-section including a wide beach of largely

quartz sand, a low foredune covered by sparse vegetation; higher dunes, some active and sparsely covered and others having trees and other vegetation, rising from 25 to almost 200 feet above Lake level in a complex of blowouts, ridges, valleys, and interdunal ponds. This cross-section exemplifies terrestrial plant succession on dune sand as described by Cowles over 70 years ago. The dynamic nature of the Indiana Dunes has attracted scientists as an ideal outdoor laboratory to study the principles of ecological succession (Olmsted, Beecher, Klotz, Krekeler, following Tr. 7979, pp. 1-2).

On the south of the dune complex, and to the north of the ancient shoreline of the Calumet stage of Lake Michigan (now the location of U.S. Highway 12), is a unique wetland area known as Cowles Bog which contains an undrained pond or depression filled with water and largely covered by a relatively thick mat of vegetation. The fact that the Department of Interior's National Park Service has designated a sizeable portion of these unique natural settings abutting the proposed plant site as a Class IV Land namely "an outstanding natural area of special significance for public edification" (Reed, following Tr. 7528, p. 5; J-I Ex. 23) has weighed heavily in the Board's consideration of the potential impact of the proposed plant on its surroundings.

104. The effects of the proposed plant on the environment can be conveniently considered as those involved in: (a) the impact of construction; (b) the impact from operation; and (c) the impacts of decommissioning.

A. *Impact of Construction*

1. *General*

105. The potential environmental impacts of construction of proposed plant identified in the FES are as follows:

(a) Noise and ground vibrations from pile driving during the initial phases of construction which may temporarily disturb visitors and wild life in the nearby Indiana Dunes National Lakeshore (pp. IV-5, VII-1);

(b) Dust from construction activities, possibly including blowing sand and cement aggregate (p. IV-5);

(c) An increase in automobile traffic during construction due to the travel of the construction crew to and from the site (pp. IV-6, VII-1);

(d) A possible impact on local beach erosion and lake bottom disturbance if a temporary dock for delivery of the reactor vessel is constructed (pp. IV-6, VII-1);

(e) The impacts of surface water run-off (p. IV-6); and

(f) The impacts of dewatering (p. IV-6).

106. The Applicant has agreed to adopt measures to control dust from the concrete batch plant, as well as measures to cover graded areas during construction (Reg. Staff Ex. 5, pp. IV-7, D-84 and D-85).

107. The impacts of construction are not expected to be greater than those normally attendant to large construction projects (Reg. Staff Ex. 5, pp. IV-6, IV-7). In any event, they will be temporary and will not remain after the completion of construction (Reg. Staff Ex. 5, p. IV-7). There is a possibility of greater impact with respect to dewatering activities and surface water run-off, both of which we discuss below.

108. Assuming control measures are taken with respect to dewatering as discussed below, we find that the adverse environmental impacts of construction on the proposed plant will be small.

2. *Surface Water Runoff*

109. In Contention 63, Intervenors allege that Applicant's ultimate site development due to construction and

operation of N-1 will result in increased surface runoff and storm water disposal problems.

The Applicant and the Regulatory Staff testified that the Bailly site is generally flat and the surface generally porous (Chauvin, following Tr. 4680, p. E-63-1; Fisher, following Tr. 6039, p. 1). Joint Intervenors concede that this is the case (Hilty, Olmsted, and Read, following Tr. 8759, pp. 14-15). This flat, porous surface has a capacity to accept storm water without ponding (Chauvin, following Tr. 4680, p. E-63-1; Fisher, following Tr. 6039, p. 1; Hilty, *et al.*, following Tr. 8759, p. 15; Tr. 4700, 8785). No previous problem with surface runoff has been encountered (Tr. 4684-85, 4695), and none is expected even though construction of Bailly N-1 will reduce the porous surface available to accept the water (Fisher, following Tr. 6039, p. 1; Tr. 4681).

During construction, while structures are open to the weather, storm water collecting in the structure, as well as water discharged from roof drains, will be discharged into the existing discharge flume for fossil Units 7 and 8, and ultimately to Lake Michigan (Chauvin, following Tr. 4680, p. E-63-1; Tr. 4692). Similarly, any increase in the quantity of surface water runoff from other sources could be controlled by collection and discharge through the discharge flume for Units 7 and 8 (Tr. 4694). In addition, it could be trucked from the site in tank trucks (Tr. 4694), or diverted by physical barriers in some manner (Fisher, following Tr. 6039, p. 1; Tr. 6060) so that it would not enter the National Lakeshore. Although Applicant had stated that no problem was expected with respect to increases in contaminants of surface water runoff due to construction activities, control of any such contaminants, if required, could be accomplished relatively easily by diversion to a collection point and separation of the contaminants from the water for disposal (Fisher, following Tr. 6039, p. 2; Tr. 4688-90, 4693-94, 4698-99, 6060).

The Joint Intervenors' direct testimony stated that the quantity of runoff during heavy rains would cause "sheet flow and washing . . . along unvegetated grades of 15 percent or more. . . ." (Hilty *et al.*, following Tr. 8759, p. 15). However, their witnesses were unable to identify any such grade on the Applicant's site (Tr. 8774, 8805). The testimony also stated that airborne particulates will gradually cover the permeable surface of the site and increase the amount of runoff (Hilty *et al.*, following Tr. 8759, p. 16). However, no such effect has yet been observed even though the fossil generating plants at the site have been operating for some time (Tr. 4695-96).

110. We find that the allegations of the Joint Intervenors' Contention 63 that increased surface water runoff from the site will "pollute" the Lakeshore lack merit. The surface water runoff from the site due to construction and operation of the proposed plant will not have a meaningful impact on the Lakeshore either because of increased amount of water or because of increased amount of contaminants in the water. In the event that surface water runoff problems arise unexpectedly, there are ample means to correct the situation.

3. *Dewatering* [12]

111. In Contention 62, the Joint Intervenors allege that during the life of the plant, the Applicant engage in a site dewatering program and that dewatering resulting from the construction of the proposed plant will result in permanent damage to portions of the Indiana Dunes National Lakeshore by lowering the ground water table and draining ponds and bogs in the adjacent portion of the National Lakeshore.

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[12] Although Joint Intervenors apparently allege that dewatering and surface water runoff will have adverse effects during operation, as well as construction, we have chosen to discuss these two subjects under the heading "Impact of Construction" since any potentially operational impacts are less significant.

Actually, the Applicant will not engage in any dewatering activities during the operation of the proposed plant because the use of membrane waterproofing and waterstops on the outside of basement walls will make it unnecessary (Chauvin, following Tr. 4634, p. E-62-2, Tr. 4638). The membrane waterproofing proposed by Applicant appears to be sufficient for the purpose of preventing ground water from entering station buildings during the life of the proposed plant (Tr. 4639-40). Only negligible seepage, if any, of ground water into the building during operation is expected (Tr. 4668). Any seepage that is encountered will be dealt with by sump pumps and will not result in site dewatering (Tr. 4666).

112. Thus, the Board finds that there will not be any environmental effects due to dewatering during operation of the proposed plant.

113. During construction, dewatering of excavations for station buildings will be required (Tr. 4635; Reg. Staff Ex. 5, p. IV-6). The site will be dewatered to an elevation of approximately -4 feet (Annambhotla and Brissette, following Tr. 10334, p. 5; Tr. 4650, 10369, 10383-84). Ground level water will be prevented from being lowered in any part of the excavation below the -4 foot elevation by placing sheet piling which is essentially impervious to water around that part of the excavation below -4 foot elevation and removing any seepage through the sheet piling by local pumping (Tr. 4650, 10369). The surrounding ground water table elevation will not be significantly affected by this local pumping (Tr. 10369).

Applicant's experts calculated the potential drawdown effect due to dewatering and presented evidence to show that the estimates of drawdown resulting from the calculations are conservatively high (Annambhotla and Brissette, following Tr. 10334, pp. 2, 5-6; Tr. 10374, 10386, 10388-89). In addition, ash pond seepage is likely to offset the drawdown to some extent (Annambhotla and Brissette,

following Tr. 10334, p. 6). Intervenors' hydrologist also calculated the drawdown effects of dewatering (Tr. 8790, 8805, 8810-13). Applicant's hydrologist reviewed these calculations and stated that, in his opinion, they contained erroneous assumptions as well as numerical errors (Annambhotla and Brissette, following Tr. 10334, p. 4). Joint Intervenors' calculations assume that the site will be dewatered to an elevation of -10 feet when the record clearly shows that Applicant will dewater only to the -4 foot elevation (Annambhotla and Brissette, following Tr. 10334, pp. 4-5; Tr. 4650, 10369). We are persuaded that the Joint Intervenors' estimates of drawdown are inaccurate and too large.

Even the deepest dewatering, to elevation -4 feet, which will occur only for a fraction of the construction period, will drawdown the ground water table only about 4.2 feet and 3.0 feet at distances of 600 feet and 1000 feet, respectively, east of the excavation (Annambhotla and Brissette, following Tr. 10334, p. 6). A layer of silts and organic matter at the bottom of the interdunal ponds acts like a relatively impermeable membrane. Therefore, any drawdown of the ground water table at the interdunal ponds will produce insignificant effects on the water surface elevation in the ponds. The fact that water level in pond A has been about 2.3 feet higher than the local ground water table observed only 4 feet away from the pond substantiates that the interdunal ponds will not be significantly affected by the dewatering operations (Annambhotla and Brissette, following Tr. 10334, pp. 2-3, 6; Tr. 4640, 4648-49, 10333, 10371, 10374, 10386, 10388-89, 10394). As the distance from the excavation increases, the drawdown effect decreases (Annambhotla and Brissette, following Tr. 10344, p. 5; Tr. 7049). Applicant's detailed testimony demonstrates that dewatering effects beyond 1000 feet would be slight. Mr. Hulman, the Regulatory Staff's expert, pointed out that if there are any effects, they would occur mainly within a radius of one-half mile from the

site (Tr. 7048-49, 7072). Areas outside of a radius of one-mile from the site, such as Cowles Bog and the more distant parts of the Lakeshore, are not likely to be affected (Tr. 7048-49, 7073-74; Drawing MS-150, attachment to Testimony of Douglas E. Criner, following Tr. 4215). However, the Regulatory Staff contends that the reduction of the water table could result in a lowering of water level in the interdunal ponds with a greater effect in the closest ponds (Tr. 7049).

Applicant will therefore monitor the pond water levels to detect any adverse effects of dewatering (Dunn and Gerhold, following Tr. 9429, p. 1; Tr. 4637-4644). The Staff has approved this program (Tr. 9566).

If, notwithstanding the predictions of Applicant's expert, this detailed monitoring program indicates that dewatering does have an effect in the Indiana Dunes National Lakeshore, appropriate remedial steps can be taken by the Applicant, such as adding water directly to any ponds being affected or recharging water into the ground east of the dewatering site (Attachment to Dunn and Gerhold, following Tr. 9429, p. 3; Tr. 4638, 7051-52, 7062).

114. The Joint Intervenors have expressed concern that, in the event addition of water directly to the ponds were utilized, water of the same quality would not be available and that water of a different quality might damage the ecology of the interdunal ponds (Olmsted, following Tr. 9194, p. 1; Tr. 9204). However, they concede that there is some range over which water quality may vary without damaging the pond ecology (Tr. 9199, 9204).

115. The Applicant has described a program which could provide water of such quality that the ponds will be protected (attachment to Dunn and Gerhold, following 9429, p. 3; Tr. 9432, 9444-45). The Regulatory Staff approved this program (Tr. 9525-66).

The Board finds the Applicant's proposed "Monitoring Program for Water Levels of Interdunal Ponds During Construction Dewatering," submitted in response to the Regulatory Staff's testimony and subsequently approved by the Regulatory Staff, contains the necessary steps for detection of any effects on the interdunal ponds of dewatering activities during construction and the mitigation of such effects by replacement of compatible water or recharging of ground water and will prevent any significant adverse environmental impact to the National Lakeshore.

B. *Impact of Operation*

1. *General*

116. Almost all of the potential environmental impacts of operation of the proposed plant are discussed at length below in connection with contentions raised by the Joint Intervenors relating to the possible effects of the cooling tower, discharges to Lake Michigan, relationship of the proposed plant to the ash ponds, entrainment and impingement of aquatic life, and decommissioning of the plant.

117. The FES also discusses a number of other impacts, such as land use and water consumption, which for the reasons there discussed, we find are not significant in the case of the proposed plant (Reg. Staff Ex. 5, pp. V-1 and V-8).

118. During routine operation of the proposed plant at full power, small quantities of radioactive material will be released to the environment. Such releases will be as low as practicable in accordance with 10 CFR § 50.36a and will be within 10 CFR Part 20 limits. The Applicant has expressed the intention of maintaining releases within the requirements of the proposed Appendix I to 10 CFR Part 50 (Reg. Staff Ex. 5, p. V-27; Appl. Ex. 1E, p. 9.1-1).

Both the Applicant and the Regulatory Staff have made calculations of the radiation doses to the population within

50 miles of the proposed plant using stated assumptions relative to dilution, biological accumulation in food chains, "use factors" by people, and various exposure pathways (Reg. Staff Ex. 5, § V.F; Appl. Ex. 9, § 8.5). Each also calculated the radiation doses to transportation workers and members of the general public as a result of transportation of new fuel to proposed plant and irradiated fuel and solid radioactive wastes from proposed plant (Reg. Staff Ex. 5, pp. V-32 to V-36; Appl. Ex. 9, § 8.5.13). The Regulatory Staff estimated that the total doses to the population from all sources from operation of proposed plant would be approximately 40 man-rem/yr compared to an annual dose to the population of about 910,000 man-rem resulting from the natural background dose rate of about 0.125 rem/yr (Reg. Staff Ex. 5, V-36). The Applicant's calculated man-rem doses due to proposed plant were even less (Appl. Ex. 9, p. 8.5-36).

119. We conclude, as did the Applicant and the Regulatory Staff, that the proposed plant will contribute an extremely small increment to the background radiation dose of the population and that since fluctuations in background may be expected to exceed the small increment contributed by proposed plant, the incremental increase will be immeasurable in itself and will constitute no meaningful risk (Reg. Staff Ex. 5, p. V-36; Appl. Ex. 9, § 8.5.14).

Similar conclusions can be drawn with respect to radiation doses associated with plant operations to other forms of life in the environs of the proposed plant. Laboratory data indicate that the doses which lower forms of life may receive without evidence of injury are very much higher, frequently measured in thousands of rads (Tr. 4148). Terrestrial organisms in the environs of the proposed plant would receive approximately the same radiation doses as those calculated for man. Aquatic organisms will receive higher doses because of their ability to concentrate radionuclides from the water in which they live. The highest

doses would be received by aquatic organisms living immediately adjacent to the discharge point. Under these conditions the highest doses to the fauna would be measured in millirads per year; doses manyfold lower than those which are known to be injurious to animals (FES V-22). Thus, the limitation of the dosage to human beings would also protect lower forms of life from doses which could cause them injury (Tr. 4125, 4148-49).

2. *Effects of Cooling Towers*

a. *Sulfuric Acid Fallout*

120. The Joint Intervenors have alleged that a number of adverse effects will result from operation of the natural draft cooling tower which will be part of the proposed facility. Contention 24 alleges that, under certain meteorological conditions, the cooling tower plume will merge with the plume from the smokestack of Applicant's existing coal-fired Units 7 and 8, and that the merging will produce an interaction between the cooling tower plume and the SO_2 and the particulates in the smokestack plume yielding sulfuric acid droplets which will precipitate as "acid mist." The Joint Intervenors also allege that there may be cooling tower plume interaction with emissions from neighboring steel plants which will contribute to the acid mist. Contention 25 alleges that the sulfuric acid fallout will have an adverse effect on the biota in the Indiana Dunes National Lakeshore and may add further pollution to Lake Michigan.

121. The Regulatory Staff's witnesses presented evidence that the operation of the proposed cooling tower will not result in increased deposition of sulfuric acid beyond that which is presently deposited through natural precipation (Carson, following Tr. 5559, pp. 2-3).

Acid formation due to interaction of SO_2 from the stack with the cooling tower plume requires plume mixing. The

physical geometry of the fossil plant stack and the cooling tower and the ambient meteorological variables migitate against the high probability of the mixing of the two effluents. Assuming worst possible ambient conditions, which might occur 1% of the time, the Applicant's expert used a model to compute the sulfuric acid concentrations which would represent maximum possible values. These peak sulfuric acid concentrations range from 1000 ug/m³ after merger of the plumes at 5 kilometers to about 100 ug/m³ at 10 kilometers downwind. The peak concentrations would be found along a thin line 300 meters above the ground (Smith, following Tr. 3366, pp. E-24-25-10 and -11; Tr. 3359-62, 3460-65). Computations of concentrations at ground level yielded values of 1 to 5 ug/m for the acid droplets (Smith, following Tr. 3366, pp. E-24-25-12 and -13; Tr. 3395-99).

The Joint Intervenors also presented an expert witness, whose testimony at first appeared to be in direct contradiction to the maximum sulfuric acid concentration of 1000 ug/m³ predicted by Applicant's expert (Aynsley, following Tr. 7874, p. 2). Dr. Aynsley testified that measurements made at the Keystone Generating Station during operation at 1440-1530 MWe indicated "typical acid mist concentrations of 10,000 to 20,000 ug/m³ and possibly as high as 50,000 ug/m³." However, it was later brought out that his calculations were based upon the number of micrograms of *acidic water* without regard to the degree of acidity. His estimate dealt in terms of micrograms of acid droplets, not of sulfuric acid (Tr. 9181-82). When the reported calculation of 10-20,000 ug/m³ of acidic water was converted into concentrations of *sulfuric acid,* it was found to be less than 1 ug/m³ (Smith, following Tr. 10046, pp. 1-2, 5-6). Dr. Aynsley's testimony, therefore, confirms the conservatism of the peak concentration of sulfuric acid (1000 ug/m³) estimated by the Applicant.

The Applicant examined the possibility of the mixing and interacting of various emissions of the Bethlehem Steel

plant with the cooling tower plume to form acid droplets. Because most release heights and plume buoyancies are low and the emission rates are low, there is little possibility for interaction with the tower's visible plume. The Bethlehem power plant has 250-foot stacks, but the emission rates are low and concentrations of particulate matter and SO_2 in ambient air will be low downwind. Even if the plumes were to interact, the highest concentration of H_2SO_4 droplets that could result from mixing is approximately 10 ug/m³. That would occur under very stable conditions when the droplets formed could not diffuse to the ground (Smith, following Tr. 3366, pp. E-24-24-13 to -16; Tr. 3482-87).

122. One of the Applicant's expert biologist testified that the threshold for SO_2 injury for the most sensitive plant species is greater than 0.1 mg/liter, an estimate which can be equated to the effects of H_2SO_4. The 0.1 mg/liter concentration is approximately equivalent to 200-225 ug/m³ of air. The estimated maximum concentration of sulfuric acid is 1-5 ug/m³. There is, therefore, a large margin of safety (Tr. 3502-06). He concluded that the predicted concentrations at ground level will not have adverse effects on the vegetation. In fact, he stated that concentrations might be as much as an order of magnitude higher than the predicted numbers and yet not have an adverse effect on the vegetation (Tr. 3370-71; 3492-94).

The Regulatory Staff's expert was of the opinion that natural precipitation (rather than droplet dispersion) is the principal mechanism for bringing to the ground the reaction products of the atmospheric sulfur cycle. He stated and the Applicant's witness agreed that conditions favoring formation of acid misting are already present at the Bailly site as a result of natural atmospheric processes (Carson, following Tr. 5559, p. 4; Tr. 3377, 3400). The introduction of an additional source of vapor might introduce a change as far as the acid misting situation is concerned but this

change could not be substantial in view of the fact that the moisture in the cooling tower plume would constitute a minor addition to what is naturally occurring at the location (Tr. 3377-82, 5588-89). If acid misting were a real problem, its effects should already have been observed at the Bailly site, as well as other existing fossil plants, without the presence of cooling towers (Carson, following Tr. 5559, pp. 2-3; Tr. 5635-37). The addition of a cooling tower will not augment the natural processes sufficiently to cause a problem where one does not now exist (Carson, following Tr. 5559, p. 4; Tr. 5617).

The Joint Intervenors' basic position is that Cowles Bog and the National Lakeshore are unusual and fragile areas. Particularly in the case of the Bog, there is an ecosystem of great biological diversity which necessarily includes species at the limits of their endurance. This outstanding natural area adjacent to the proposed Bailly site is already under heavy stress from man-made pollutants. Additional artificially induced changes in the environment, however slight, incremental or subtle, can result in significant damage or removal of some of the rare species, the species which are at the limits of their endurance, and reduce the diversity which exists in the Indiana Dunes National Lakeshore. Reducing the diversity undermines the national significance of the National Lakeshore and thereby undercuts the very basis of its existence (Olmsted, Beecher, Klotz, Krekeler, following 7979, pp. 13, 14, 15).

In answer to the Joint Intervenors' position, the Applicant presented a rebuttal witness, Dr. Lamping (following Tr. 10752). He presented a description of the nature and development of acid bog such as Cowles Bog to put into context (as he sees it) the assertion relating to "rare" and "unique" plants and "diversity" in the ecosystem.

He pointed out a bog is a naturally dynamic, changing, and fluctuating community. Its development is a continuing process with advances and reversals. Over the long term

of bog maturation, there is continual loss of some species and replacement with other species—natural ecological succession (Lamping, following Tr. 10752, pp. 8-10; Tr. 10771-74). Because of environmental changes and the bog's ability to respond, the actual sequence of events that normally occurs is not a simple linear succession. There is frequent extinction of species, followed by replacement with other species or eventual reappearance of the same species. Some attempts to explain species disappearances rely on the fact that, since many of the bog plants are at or near the limit of their geographical range of distribution, they are therefore in an ecologically precarious position, bordering on possible extinction. An experiment testing this hypothesis was conducted for a period of twenty years. Venus Fly-trap plants were moved more than 300 miles north of the plant's natural northern limit of distribution. The transplants have been able to survive and produce good seed. This is strong indication that their grasp is secure rather than precarious. The data from this experiment shows that plants which are at the limit of their natural distribution are not necessarily at the limit of their endurance. Stress increases as an organism is found beyond its natural range of distribution but contemporary ecologists agree that, with few exceptions, organisms do not occur throughout the entire range of environmental conditions that they are actually capable of occupying (Lamping, following Tr. 10752, pp. 11-13; Tr. 10774-82).

123. To survive and persist for 10,000 years, Cowles Bog could not have been a brittle rigid community, fixed in species composition, and manifesting no change. It has accommodated each challenge of environmental forces in succession and emerged as a viable, dynamic community (Lamping, following Tr. 10752, pp. 23-24). Dr. Cowles himself recognized the naturalness and necessity of change. His main thesis was that the Dunes communities constantly change and, because they change "in response to varying conditions," they continue to survive (Lamping, following

Tr. 10752, p. 24). If the Bog is "fragile," it has a fragility which has withstood fire, water, and changes of climate. Few artificial changes could match the immensity of the natural changes the Bog has endured. The Bog has demonstrated its substantial ecological capacity to resist, to survive, to adjust, to recover, and to adjust again (Lamping, following Tr. 10752, pp. 25-26; Tr. 10783-84).

Against this background, Dr. Lamping concluded that it is highly unlikely that the low-level environmental impacts of the types conservatively predicted to result from the construction and operation of the proposed plant could exert enough influence to substantially overcome the Bog's ecological inertia, and cause irreversible harm to the community (Lamping, following Tr. 10752, p. 26; Tr. 10788-813).

More particularly with regard to sulfuric acid misting, Dr. Lamping concluded on the basis of the testimony presented by the Regulatory Staff and the Applicant that the calculated incremental amounts of sulfuric acid will not precipitate a sudden and catastrophic change in the communities nor have any significant recognizable effect on the vegetation (Lamping, following Tr. 10752, p. 26).

124. The Joint Intervenors' Contention 25 alleged that sulfuric acid fallout will pollute Lake Michigan. In fact, sulfuric acid formation as a result of interaction of the plumes is expected to have a negligible effect on Lake Michigan. Using extremely conservative assumptions, the Applicant estimated the annual incremental change in the lake water pH at less than 0.01 pH units. We conclude that the effect on the lake water will be negligible (Smith, following Tr. 3366, pp. E-24-25-16 and -17; Tr. 3371).

125. On the basis of all the foregoing, we conclude that the construction and operation of the proposed plant will not result in the formation of sulfuric acid that would have an adverse impact at Bailly and its surroundings, including the National Lakeshore, Cowles Bog, and Lake Michigan.

However, due to the special nature of the area surrounding the Bailly site, the Regulatory Staff has indicated that it believes it to be essential that a comprehensive monitoring program be adopted so that if acid misting problems should occur, they are detected before irreversible damage is done (Reg. Staff Ex. 5, p. V-15). During the course of the hearing, the Applicant committed itself to undertaking a monitoring program which has been approved by the Regulatory Staff, to determine whether any unexpected impact, in fact, occurs, and to take remedial action if a significant impact attributable to the operation of Bailly N-1 was found (Tr. 4982-83, 5036, 5041). Several possible remedies were identified.

These included a change to low sulfur coal or use of SO_2 scrubbers if such become available (Tr. 5037-38, 5564-66; Reg. Staff Ex. 5, p. V-15). However, the Applicant has indicated that a determination as to which remedial method would be most suitable would be based upon the particular circumstances, if any, that arose (Tr. 5037-38).

b. *Salt Deposition*

126. The Joint Intervenors allege that the water droplets in the drift from the cooling tower plume will contain salt residues from cooling tower blowdown amounting to approximately 316,000 pounds per year. The salt fallout, they allege, would have an adverse effect on plants in the National Lakeshore and Cowles Bog and under offshore wind conditions could add further pollution to Lake Michigan.

127. Three different estimates of salt fallout rate from the cooling tower drift were presented in the respective testimonies of the meteorologists of each of the parties.

Applicant's meteorologist estimated the salt fallout rate at approximately 235,000 pounds per year total assuming a 600 part per million limit on salt concentration in the circulating water (Smith, following Tr. 3072, p. E-26-6). Using a droplet fallout model, he estimated salt deposition would be 3.5 pounds per acre per year at a downwind distance of 5 to 8 kilometers, and less than 3 pounds per acre per year at distances closer than 5 and greater than 8 kilometers (Smith, following Tr. 3072, p. E-26-7).

The Regulatory Staff meteorologist estimated the salt fallout rate at approximately 238,000 pounds per year total assuming a station load of 80% (Carson, following Tr. 5924, p. 3; Reg. Staff Ex. 5, p. V-16) and, based on diffusion—deposition model, estimated the maximum salt fallout density to be 0.61 pounds of salt per acre per year at a point 1.5 miles of the cooling tower (over Lake Michigan). Over land areas, all calculated deposition rates were less than 0.5 pounds per acre per year.

Joint Intervenors' expert estimated the salt fallout rate to be approximately 250,000 to 300,000 pounds per year total. He emphasized that the calculations by the Regulatory Staff and the Applicant resulted in an estimated average deposition rate, and that the rate at any given time could be higher or lower and predicted that with low wind speed a short term deposition rate as high as 100 pounds per acre per month could occur for a few hours (Aynsley, following Tr. 7874, pp. 2-3).

Both the Regulatory Staff's and the Applicant's experts recognized that for a few minutes or hours the deposition rate could exceed the average annual rate (Tr. 5951-52, 10052-55). Mr. Smith, called on behalf of the Applicant, estimated that the rate over a several hour period might be as much as a single order of magnitude higher than the annual rate (Tr. 10052-55). However, both the Regulatory Staff's biologist and the Applicant's witness testified that the salt deposition as projected is small in comparison to

natural deposition (Zussman, following Tr. 5924, p. 5; Smith, following Tr. 3072, p. 7; Tr. 5966) and is less than that which results in damage (Tr. 3075-80, 3284, 3287, 3311-14, 5966-68).

Dr. Johnson, testifying for the Applicant, stated the opinion that even if the calculated quantity of 3.5 lb/acre were applied instantaneously, *i.e.*, 3.5 lb/acre/hour or minute, it would not likely have an adverse effect on the vegetation (Tr. 3076-77, 3286-93). This would be true even if the deposition were to occur during a period of stress when it is more easily injured (Tr. 3301-03). Dr. Johnson also concluded that the fallout would have no effect even if it were to continue for a period of 40 years because, through operation of normal processes, the salt will be washed off the foliage, into and through the soil, and into Lake Michigan (Tr. 3079-80).

The Joint Intervenors made no attempt to relate the amount of salt deposition which may result from the operation of Bailly N-1 cooling tower to damage to vegetation in the National Lakeshore. Rather, they rested on the position that the bog contained rare species existing at the extremes of their geographic limits and that any impact could cause the destruction of the ecosystem.

With respect to deposition in the waters of Lake Michigan, the Applicant's biologist testified that based on his knowledge of the chemical composition of Lake Michigan waters, the estimated amount of salt fallout would have an insignificant effect on the Lake as far as contributing to existing ambient levels (Tr. 3077-78). The Regulatory Staff testified to the same effect (Draley, Carson, Zussman, following Tr. 5924, pp. 4-5), and Joint Intervenors produced no controverting evidence.

128. The Board concludes that salt fallout as a result of cooling tower operation at the proposed plant will have little adverse impact on vegetation in the vicinity of the Bailly site including the National Lakeshore and Cowles

Bog, and would be insignificant with respect to Lake Michigan.

c. *Weather Modification*

129. Natural-draft cooling towers rely primarily on evaporation of water for their cooling effect and transfer large quantities of water vapor and heat to the atmosphere. Before this moisture and heat can be completely dissipated by mixing with large volumes of ambient air, condensation usually occurs and produces an elevated plume of visible water droplets (Reg. Staff Ex. 5, p. V-2; Tr. 5670; Smith, following Tr. 3531, pp. E-27-1 and 2). It is the contention of the Joint Intervenors that the operation of the natural draft cooling tower will result in weather modifications within several miles of the Bailly site and that the impacts of these weather modifications are adverse.

The expert witnesses for all parties agreed that there will always be a visible plume at the top of the cooling tower whenever the nuclear plant is operational and thus is a manmade intrusion upon the landscape (Tr. 5670; Smith, following Tr. 3531, pp. E-27-1 and 2; Aynsley, following Tr. 7874, p. 3). The visible plume is, in fact, an elevated foggy area or a cloud (Tr. 5670; Smith, following Tr. 3531, p. E-27-2), and as other clouds it reduces sunshine (Tr. 5670). Applicant's witness attempted to quantify such reduction of direct sunshine within the immediate area of Bailly and concluded that a maximum value would be 1% (Tr. 3625, 3630-31). This was not disputed.

All experts agreed that ground level fogging and icing would not present a problem (Reg. Staff Ex. 5, p. V-5; Tr. 5673, 5676; Smith, following Tr. 3531, pp. E-27-2-7; Aynsley, following Tr. 7874, p. 3). The Applicant and the Regulatory Staff witnesses also testified that while there was a possibility of augmenting snowfall, the addition to the snowfall would be trivially small and not significant on a seasonal basis (Reg. Staff Ex. 5, pp. V-4 and 5; Tr. 5672;

Smith, following Tr. 3531, pp. E-27-7 and 8). The Regulatory Staff's witness estimated the upper limit to augmentation of precipitation by the tower at 1-2% of the annual total (Tr. 5677-80). Applicant estimated the maximum increment in precipitation to be 1% (Tr. 3623-24, 3628-29). Joint Intervenors presented no controverting evidence.

130. We conclude that except for a minimal increase in local snowfall, the cooling tower plume will not result in adverse modification of weather conditions.

d. *Visual Impact*

Joint Intervenors contend that the cooling tower and cooling tower plume will constitute visual pollution.

131. The predominant structure at the Bailly N-1 station will be the cooling tower which is a monolithic concrete structure with a natural concrete finish. It will have a hyperbolic shape and will be approximately 400-450 feet tall and 440 feet in diameter at its base. The tower will be situated near the southwest corner of the Bailly site (Reg. Staff Ex. 5, p. III-1; Bohn, following Tr. 3653, p. E-28-5 through -7; Tr. 9271-72). During operation, there will always be a visible plume from the top of the cooling tower. The size of the plume would vary, ranging in length from a few tower heights to several miles, depending on plant load factors and weather conditions (Reg. Staff Ex. 5, p. V-3; Tr. 5516-17; Bohn, following Tr. 3653, pp. E-28-10 and 11). The cooling tower will be visible from portions of the National Lakeshore (Bohn, following Tr. 3653, p. E-28-6; Tr. 3677-84; Read, following Tr. 7248, p. 2; Geckler, following Tr. 5515, p. 1). While the tower will be approximately the same height as the existing chimney for the fossil Units 7 and 8, the greater diameter of the cooling tower will make it visible in some instances in which the existing fossil plant chimney is not (Tr. 3656-58). The Applicant's witness testified that the natural foliage of the National Lakeshore would obscure, at least partially, any view of the cooling

tower from the Lakeshore (Bohn, following Tr. 3653, pp. E-28-6 and -7; Tr. 3681-83, 3704). In addition, since the dunes rise sharply behind the beach, the cooling tower would not be visible from many beach areas (Tr. 3698-99, 7270). All parties have agreed that the cooling tower would be a man-made intrusion on local visual scenes. However, the significance of such intrusion was differently assessed.

132. The Regulatory Staff presented a witness who attempted to indicate the extent of visibility of the cooling tower by means of line diagrams from selected points within and adjacent to the Indiana Dunes National Lakeshore (Fig. 2, Figs. A-E, Appendix pp. 5-10, following Tr. 5515). He also attempted to assess the maximum effect (by not taking credit for the effects of vegetation) of the visual impact on the nearby residential area by diagramming the apparent area of the tower to a person situated in a residence one and one-half miles from the tower, viewing it ten feet from the window (Geckler, following Tr. 5515, pp. 3-4; Tr. 5541-42). He agreed the tower would be a man-made intrusion (Tr. 5537).

The Applicant presented a witness who attempted to quantify the extent of the visual impact in terms of the solid angle subtended by the tower, comparing its proportions in this respect to those of a dollar bill (Bohn, following Tr. 3653, pp. E-28-8 through -10). He stated that the Bailly site was located within a heavily industrialized area on the edge of the National Lakeshore (Bohn, following Tr. 3653, pp. E-28-2 and -3; Tr. 3663-64). The plant itself will be bound to the west and south by a large steel making mill, to the east by the existing fossil units at the site, and to the north by Lake Michigan (Bohn, following Tr. 3653, p. E-28-3). While emphasizing the screening effect of foliage (Bohn, following Tr. 3653, p. E-28-7), Mr. Bohn admitted that when viewed through the foliage, the tower was not indigenous to the natural scene (Tr. 3684). The Applicant presented another witness, an architect, who

testified in detail as to the subjective nature of the aesthetic judgment involved (Miller, following Tr. 10713, pp. 1-5). He stated he found a hyperbolic tower pleasing but conceded that the cooling tower is not indigenous to the natural scene in the National Lakeshore (Miller, following Tr. 10713, p. 1).

The Joint Intervenors presented a witness who attempted to demonstrate the visual impact of the proposed cooling tower when viewed from the National Lakeshore with a number of photographs (Read, following Tr. 7248, pp. 4-7). The photographs were grouped in pairs, one showing the present view towards the proposed tower sites from a particular location within the Lakeshore and the other showing that same view with a drawing of the proposed tower superimposed by the photographer witness (J-I Ex. 22). Recognizing that these photographs may be deficient in some respects, including that no attempt was made to measure or calculate distances or draw to an accurate consistent scale (Tr. 7253-59, 7319, 7332-7336), that the matted finish might result in a reduction in detail and tonal quality (Tr. 7259-61, 7312-13, 7289; Appl. Ex. 23), and that the location of these photographs were selected by the witness and might not provide a fair representation of the locations from which the tower would be screened by topography or vegetation (Tr. 7263-69), nevertheless, they demonstrate the undisputed fact that the tower would constitute a man-made intrusion into the natural scene. The Joint Intervenors presented as a witness, Assistant Secretary Nathan P. Reed of the Department of the Interior, who testified that the proposed natural draft cooling tower constituted an intrusion upon the natural scene (Reed, following Tr. 7528, p. 8). In addition, the Joint Intervenors presented the testimony of three additional witnesses who were personally familiar with the general topography of the National Lakeshore adjacent to the Bailly site. They testified that the tower and its plume constituted a massive

man-made intrusion upon the natural scene (Dustin, Troy, Olin, following Tr. 8952, p. 2).

133. We find that the proposed natural draft cooling tower constitutes a man-made, visual intrusion which is an adverse environmental impact of the Bailly plant, although we recognize that esthetic effects are evaluated differently by different people. This impact was factored into the Board's assessment of alternative locations for the facility and into the cost-benefit balance performed by the Board with respect to the proposed Bailly plant.

3. *Deposition of Waste Materials to Lake Michigan*

134. The thrust of the Joint Intervenors' Contention 30 is that the cumulative deposition of waste materials from the construction and operation of the proposed plant, which will be added to the circulating water discharge from fossil fueled Units 7 and 8, will create a significantly adverse effect on Lake Michigan. They specify the waste materials as including sodium chloride, calcium and magnesium sulfates, radionuclides, oil and grease. Finally, they allege that the dilution of the wastes in the cooling water from the coal fired plants will obscure the fact that large quantities will be released, and that the Applicant should be required to install and operate abatement equipment which will reduce waste to levels that will comply with water quality standards prior to any dilution in the cooling water discharge.

Effluents discharged to Lake Michigan from the proposed plant during operation will result from three sources: the cooling tower blowdown; the plant service water system; and releases from the excess demineralized water tank (Ricca and Lauer, following Tr. 3811, p. E-30-1).

The Applicant will regulate operation of the cooling tower (*i.e.*, the rate of blowdown) to maintain a maximum concentration of 600 ppm of total dissolved solids in the

circulating water system, which will thus be the maximum concentration in the blowdown (Ricca and Lauer, following Tr. 3811, p. E-30-2; Tr. 3816, 3864). This will be approximately four times more concentrated than the make-up water from Lake Michigan, although this ratio will vary depending upon the quality of Lake Michigan water. Individual constituents of the make-up water will be concentrated in the blowdown in the same ratio. The blowdown from the cooling tower is added to the service water return to form the combined discharge. This discharge is then added to the water return from Units 7 and 8 to form the overall Bailly Station discharge. The Applicant estimated the cooling tower blowdown, proposed plant service water return, and the water return from Units 7 and 8 to be approximately 2,500 gpm, 10,100 gpm, and 336,500 gpm, respectively, and the Regulatory Staff's estimates were similar (Ricca and Lauer, following Tr. 3811, pp. E-30-5 to -8; Draley, following Tr. 6070, pp. 6-7).

135. The State of Indiana Water Quality Criteria (Regulation SPC 4-R, reproduced in Appendix C of the Reg. Staff Ex. 5) contain criteria for evaluation of waters of Lake Michigan which are applicable at any point in Lake Michigan, except that in areas immediately adjacent to outfalls "cognizance will be given to the opportunities for the admixture of waste effluents with the receiving water" (Reg. Staff Ex. 5, p. C-2). Pertinent criteria for total dissolved solids, chlorides, and sulfates are set forth (Reg. Staff Ex. 5, p. C-5). The Applicant's calculations show that the concentrations of various constituents in the proposed plant discharge, even before dilution with the discharge from Units 7 and 8, would closely approximate the SPC 4-R concentration criteria for Lake Michigan. Thus, admixture in Lake Michigan would quickly reduce the concentrations in the discharge from N-1 below the concentrations set forth in SPC 4-R, even without regard to any dilution by the return from Units 7 and 8 (Ricca and Lauer, following Tr. 3811, pp. E-30-5 and -6). Moreover, in

light of the large return from Units 7 and 8 (336,500 gpm), the actual concentrations at the outfall of the combined discharge (including N-1) from the Bailly Station will be at levels below the SPC 4-R concentrations even before admixture in Lake Michigan (Ricca and Lauer, following Tr. 3811, pp. E-30-5 and E-30-7; Draley, following Tr. 6070, p. 7). Although Contention 30 in effect argues that the dilution of Units 7 and 8 should not be taken into account in determining compliance of the proposed plant with applicable water quality standards, the Joint Intervenors provided no legal or technical basis for this position, and we find that none exists. We also find that, as testified by both the Applicant and the Regulatory Staff, the dissolved solids returned to Lake Michigan by the proposed plant cooling tower blowdown will be inconsequential in amount and will have a negligible environmental impact (Ricca and Lauer, following Tr. 3811, p. E-30-7; Draley, following Tr. 6070, pp. 10-12; Tr. 3817-18).

136. Water for the service water cooling system and for the cooling tower must be chlorinated periodically to remove biological slimes that would otherwise interfere with the flow of water or with the transfer of heat. The Regulatory Staff proposed as a condition of the construction permit that Applicant control and monitor residual chlorine levels so that they do not exceed 0.1 ppm during the periods of chlorination (Reg. Staff Ex. 5, para. 8(d) pp. iv-v). The Applicant has agreed to this (Ricca and Lauer, following Tr. 3811, p. E-30-10). This will assure that the recommendation of the Environmental Protection Agency concerning such discharges will be satisfied (Reg. Staff Ex. 5, pp. III-20, V-18, D-42). The Regulatory Staff has calculated expected concentrations of residual chlorine (including free and combined chlorine), and based on studies available on the effects of chlorine on aquatic biota, has concluded that no adverse environmental impact due to chlorine will occur (Fisher and Draley, following Tr. 6070, pp. 2-4, 7-10; Tr. 6120-29, 6743-45, 6949-50).

The only other chemical which may be added to the cooling tower blowdown would be sulfuric acid to prevent precipitation of scale-forming solids in the make-up Lake Michigan water. If acids are added, the resulting dissolved solids concentrations will be maintained well within applicable limits, and the Regulatory Staff has conservatively calculated that the resultant sulfate concentrations would be acceptable (Ricca and Lauer, following Tr. 3811, p. E-30-11; Draley, following Tr. 6070, pp. 6-7 and 10).

137. The purpose of the service water system is to provide Lake Michigan water to various cooling services in the turbine building, service building, and reactor building. Aside from the previously discussed chlorine, no other material or solid is added to this system. To assure that there is no inadvertent release of radionuclides through this system, its design basis includes protective measures such as interface heat exchangers with pressure differentials that will allow leakage only from the non-radioactive section into the radioactive section. The sole exceptions are the two RHR heat exchangers. In addition, there is continuous radiation monitoring of any plant system in contact with the service water system that could inadvertently receive radioactive materials and, as a final and redundant check, there is independent continuous radiation monitoring of the service water discharge line (Ricca and Lauer, following Tr. 3811, pp. E-30-11 and -12; Tr. 1702-03).

138. The liquid radwaste system collects, processes, monitors, stores, and recycles, if possible, all radioactive liquid wastes. Any processed liquid which cannot be recycled because of the plant inventory will be released, within applicable limits, from the excess demineralized water tank. The design basis for the system is such that the release of radionuclides shall be as low as practicable and in accordance with the proposed Appendix I of 10 CFR Part 50. Protective measures to assure that design objectives are met include design redundancy, monitoring

and alarm equipment, immobility of waste batches, and procedural controls (Ricca and Lauer, following Tr. 3811, pp. E-30-12 and -13; Tr. 3825-26).

139. The condenser is the only plant equipment containing low level radioactivity that is in contact with the circulating water from the cooling tower. It is a tube and shell heat exchanger with pressures on the steam side normally maintained at approximately 38 pounds per square inch below the circulating water side. Accordingly, any leakage in the condenser would not result in the addition of radionuclides to the circulating water and hence the cooling tower blowdown is not expected to contain any significant amount of radionuclides resulting from the operation of the nuclear unit (Ricca and Lauer, following Tr. 3811, pp. E-30-13 to -14; Tr. 1737-46).

140. If oil or grease were to be accidentally released into the proposed plant, it would drain through the plant drain system into the liquid radwaste facility where it will be removed. Consequently, oil and grease are not released in the plant discharge into Lake Michigan (Ricca and Lauer, following Tr. 3811, p. E-30-14; Tr. 6175-76).

141. The Applicant does not plan to discharge any construction wastes to Lake Michigan. Any excavated materials transported to the Lake by surface water run-off would be in the form of clean sand that would not have an impact on the Lake (Ricca and Lauer, following Tr. 3811, p. E-30-14; Fisher, following Tr. 6070, p. 1; Tr. 3826-29, 6083-A to 6092, 6174-75).

142. The Board finds that the dissolved solids returned to Lake Michigan by the Bailly N-1 cooling tower blowdown will be inconsequential in amount and will have a negligible environmental impact. Also, we find that the chlorine discharges will be trivial and in accordance with the suggestions of the Environmental Protection Agency. Radioactive discharges will be "low as practicable." The

Board finds that these are the only discharges from the proposed plant to Lake Michigan and that these discharges will comply with all applicable legal requirements. The Board has taken these discharges into account in the cost-benefit analysis it has performed with respect to the proposed plant.

4. *Ash Ponds*

143. The Joint Intervenors' Contention 31 alleges, in substance, that the proposed use of ash settling ponds for dumping ash and other liquid wastes, including sewage effluent, will cause pollution of the Indiana Dunes National Lakeshore and Cowles Bog. This contention also included allegations that Applicant had grossly abused the National Lakeshore by discharging from one of the ash ponds into a natural pond, dumping of ash into the edges of the bog, using part of the green belt for dumping ash and stripping, leveling of dunes in the Indiana National Lakeshore.

144. There are four ash ponds at the Bailly site which were constructed by excavation during and following the construction of the fossil fired Units 7 and 8. The primary use of the ash ponds is to act as a series of settling basins to remove ash from sluice water pumped from the fossil units (Criner, following Tr. 4215, p. E-31-1). The ash ponds are currently part of an open system. The Applicant has indicated that it plans to make modifications to the ash pond system which will result in them being operated as part of a closed cycle system with no direct discharges into the Lake and 100% of the water pumped from the fourth pond being recirculated and reused within fossil fired Units 7 and 8. These modifications are scheduled to be accomplished prior to the initial operation of Bailly N-1 (Criner, following Tr. 4215, p. E-31-2; Reg. Staff Ex. 5, p. V-19).

The Applicant proposes to discharge certain wastes from the operation of the proposed plant to the ash pond sys-

tem. These wastes will include the filter backwash water and demineralized regenerate waste from the nuclear plant's demineralized water system. This will be approximately 26 to 27 pounds per day of dissolved salt added to the ash ponds (Criner, following Tr. 4215, p. E-31-12; Criner, following Tr. 9977, pp. 1-2; Tr. 9978-9992). In addition, the sanitary and sewage wastes from the proposed plant will be combined with those from fossil fired Units 7 and 8 and processed through an aeration type sewage treatment plant. The discharge will be sent, after chlorination, to the ash ponds (Reg. Staff Ex. 5, p. III-21). Although the estimated effect on the ash ponds from the addition of treated sewage plant effluents is small (Tenney and Criner, following Tr. 9903, pp. 3-4), the Applicant, nonetheless, has committed on the record to include equipment in the sewage treatment plant to reduce phosphorous concentration and to incorporate into the design of the sewage treatment plant the ability to add further nitrogen removal capacity at a later date if necessary (Tenney and Criner, following Tr. 9903, pp. 4-5). Since it is planned to operate the ash ponds as a closed system in the future, none of these wastes will be returned directly to Lake Michigan.

145. The evidence relating to this contention focused on existing seepage from the ash ponds and the effect such seepage had on the Lakeshore area and the natural ponds. There is existing seepage from the ash ponds estimated at approximately 1 million gallons per day which is supplied by the open cycle sluice water from the fossil plants (Tr. 4220, 4292, 7047). It will be necessary to add make-up water from Lake Michigan to the ash pond system at a rate of approximately 1.3 million gallons per day even with the 100% recycle or closed system proposed by the Applicant (Tr. 4280, 4292). The rate of seepage may be affected by dewatering during construction of the plant (Tr. 7049). This increased seepage would generally go in a northwesterly direction due to the ground water flow (Tr. 7049,

7062), and therefore, is not likely to contaminate the bog (Reg. Staff Ex. 5, p. V-20). Nevertheless, the Regulatory Staff indicated that it is important to assure against such contamination and has recommended that the water quality of the nearby interdunal ponds be monitored both before and after dewatering is carried out. The Applicant has agreed to do so and has submitted in this proceeding its plan for monitoring the interdunal ponds during dewatering at construction (Dunn and Gerhold, "Monitoring Program for Water Levels of Interdunal Ponds During Construction Dewatering", following Tr. 9429; Tr. 9481-82).

146. The Joint Intervenors' witness testified regarding a chemical analysis he supervised of the waters of the interdunal ponds and of Cowles Bog (Baskin, following Tr. 7950, pp. 1-27). More than 800 individual test measurements and analyses were involved in Joint Intervenors' witness' study. He concluded, based on the data obtained in these studies and particularly the data regarding pH, dissolved oxygen, chemical oxygen demand and suspended solids, that at the present time NIPSCO's operations are polluting the interdunal ponds in Cowles Bog, that heavy metals and alkali metals and sulfate constitute the major pollutants derived from NIPSCO's fly ash, and that radioactivity derived from NIPSCO's fossil fuel fly ash has been introduced into the environment. He indicated that he believed that there would be serious damage to Cowles Bog if pollutants from Applicant's coal fired plants continued unabated (Baskin, following Tr. 7950, p. 1). This opinion was supported by Joint Intervenors' panel of biologists whose position regarding the effect of seepage on the interdunal and bog areas was similar to that taken on other issues. The ecosystems of the National Lakeshore and particularly that of Cowles Bog are sensitive and fragile and any artificially induced change in the environment, however slight, incremental or subtle, could result in significant damage (Olmsted, Beecher, Klotz and Krekeler, following Tr. 7979, p. 14). They further stated that of all

the ecosystems known to them, a sphagnum bog was one of the most vulnerable to any change at all including air pollution (Olmsted, *et al*, following Tr. 7979, p. 7).

The Applicant's rebuttal witness testified that the pH, dissolved oxygen and chemical oxygen demand measurements reported by Dr. Baskin indicate the values in the interdunal system to be those expected in natural waters in such a system and concluded that industrial operations and particularly the ash pond system do not have a significant impact on the interdunal environment (Kneip, following Tr. 10548, p. 11). The Applicant's witness disagreed with the conclusions drawn by Dr. Baskin as to the sources of the concentration of metals and with his interpretation that the concentration of the metals found in the interdunal ponds and Cowles Bog indicated significant degradation of the area. Dr. Kneip stated that such concentrations of metals fall within the ranges of concentration normally found in the earth's crust (Kneip, following Tr. 10548, pp. 1-2, Table 1; Tr. 10558, 10561, 10565-66, 10575).

147. In view of the evidence presented in this proceeding, the Board concludes that the incremental effect on the environment of the proposed discharges of filter backwash and demineralized regenerant wastes and sanitary wastes resulting from the operation of the proposed plant and discharge to the ash ponds is likely to be insignificant. In any event, the Applicant has committed to a monitoring program in the nearby interdunal ponds and bog area which will detect any adverse effects of ash pond seepage. To assure that the environmental values of the adjacent National Lakeshore are adequately protected in the event that adverse effects are detected by the monitoring program, the Board believes that the Applicant should be required to take remedial action to assure that the proposed Bailly N-1 facility does not contribute significantly to any such change. The Regulatory Staff has proposed such a condition in the FES (p. v. condition 8b). The Applicant has proposed a similar condition which reflects the monitoring programs submitted during the course of the proceeding (see Applicant's proposed findings, para. 353).

148. With respect to the allegations of gross abuse of the Lakeshore area, by direct discharge from the ash ponds, there was no substantive evidence of such abuse, nor was there any showing of any relevant connection between such allegations and this proceeding.

5. *Fish Kills*

149. The Joint Intervenors' contention as developed during the hearing was directed principally to the question as to whether the increase of cooling water for the Bailly facility would seriously aggravate an alleged problem of fish kills associated with the existing cooling water intake for the Bailly fossil fueled Units 7 and 8, and also aggravate entrainment damage to smaller aquatic organisms.

The proposed Bailly N-1 unit would require only 20,000 gpm additional cooling water intake from Lake Michigan through the existing intake system (Bohn and Lauer, following Tr. 3749, p. E-31-1; Reg. Staff Ex. 5, p. V-7). Of the total intake, flow increase due to the proposed nuclear plant would be only 6% of the existing flow for the fossil unit and no increase in the amount of water recirculated to prevent ice formation in the winter would be required as a result of the operation of the proposed plant. Accordingly, the extent to which the proposed plant would be expected to aggravate any existing fish kills and entrainment damage would be very limited.

Both the Regulatory Staff and the Applicant have provided an assessment of the potential fish kills at the Bailly station and have concluded that no significant fish kill problem would be anticipated at Bailly (Bohn and Lauer, following Tr. 3749, pp. E-35-5 and -6; Reg. Staff Ex. 5, pp. V-17 and 18). This was supported by evidence from actual field collections at the Bailly traveling screens for over six

months which showed that during this period some 5,300 pounds of fish were caught on the traveling screen. Of this, the vast majority were alewives (over 90%), a fish limited in value. This evidence is consistent with prior casual observations at the Bailly site which indicated that large numbers of sport fish had never been entrapped on the screens of the existing facility (Bohn and Lauer, following Tr. 3749, pp. E-35-5 and -6; Tr. 3773-79, 6837-39). The increase in the number of fish entrapped on the traveling screens that would be anticipated from the 6% flow increase due to the operation of Bailly N-1 is minimal. However, in light of the importance of flow velocity at the intake structure in preventing excessive entrapment, the Regulatory Staff has proposed as a condition to the construction permit that the Applicant determine the actual intake water velocity which exists around the outside of the intake structure with the present fossil fueled Units 7 and 8 operating (Reg. Staff Ex. 5, paragraph 8(c), pp. iv and v, V-17). The Applicant has stated that it plans to measure the intake velocity prior to the time Bailly N-1 goes on line (Tr. 3754-55). The Board believes that the Regulatory Staff's proposed condition is appropriate and should be made a condition to the construction permit.

Very small fish and planktonic organisms will pass through the screens and be entrained in the waters passing into the fossil plants 7 and 8 and in the waters passing into Bailly N-1. About half of the 20,000 gpm flow into the nuclear plant passes into the closed cycle cooling system and organisms in this portion of the flow would be subject to high mortality. The mortality of organisms flowing through the once through cooling systems of fossil fired Units 7 and 8 is not expected to be substantial (Reg. Staff Ex. 5, p. V-17).

Both the Applicant and Regulatory Staff considered the total amount of organisms killed in both the nuclear facility and fossil fired Units 7 and 8 to be an insignificant portion of that existing in the vicinity of the Bailly station (Reg. Staff Ex. 5, pp. V-17 and 18; Tr. 3797), and that there would be no perceptible change in the population (Tr. 3798). The Joint Intervenors have offered no direct evidence which contradicts the above conclusion. Their only evidence appears to summarize the evidence in the record on this subject in their cost summary comparison (Olmsted, *et al.*, following Tr. 9090, p. 3). The Board does not find this summary to be accurate.

While the Regulatory Staff does not believe that the operation of Bailly N-1 would be expected to aggravate any existing fish kills and entrainment damage, it has recommended that monitoring stations be established to detect unforeseen changes (Staff Ex. 5, p. V-18). Several such monitoring stations have been established in Applicant's ecological monitoring program (Johnson, following Tr. 9438, p. 13).

150. Thermal impacts on the plant and animal life in the Lake will be insignificant insofar as the Bailly N-1 plant is concerned (Reg. Staff Ex. 5, p. V-18; Tr. 3797-99).

151. The Board concludes that Bailly N-1 will have an insignificant effect on impingement and entrainment of fish and other aquatic organisms. To ensure that the environmental impacts will remain minimal, the Board adopts the Staff's proposed condition to the construction permit. The Board agrees that monitoring stations should be established to detect unforeseen changes and that such monitoring activities should be part of the Applicant's monitoring program.

6. *Monitoring Programs*

152. The Joint Intervenors have alleged that the radiological monitoring program planned by the Applicant is inadequate. They contend in Contention 36 that any valid sampling would involve a determination of the actual ele-

ments of a particular food chain, and further contend that at least six aquatic food chains and six terrestrial food chains be sampled in order to determine the radiological effects of the operation of Applicant's proposed nuclear facility. In Contention 63, the Joint Intervenors contend that the Applicant's monitoring program is deficient in that there is no commitment for continuing such program for a specific time into the future and that the proposed location of monitoring devices and frequencies of sampling contemplated are inadequate to protect the health and safety of the public and the natural values of the Indiana Dunes National Lakeshore.

The Applicant's radiological monitoring program is designed to identify the potential dose to humans resulting from "critical pathways" of exposure (Eisenbud, following Tr. 4115, p. E-26-2). This approach was found to be acceptable by the Regulatory Staff and is based on experience and recommendations made by various agencies (Essig, following Tr. 5400, p. 1). Monitoring of the critical pathway provides sufficient assurance that the radiological impact of the plants is within expected limits (Essig, following Tr. 5400, p. 1; Tr. 5412-16), and it is neither necessary to sample six aquatic and six terrestrial food chains nor all of the elements thereof (Essig, following Tr. 5400, p. 1; Eisenbud, following Tr. 4115, pp. E-36-9 and -10). It is also well established in the industry, both in the United States and internationally, that a pre-operational monitoring program of approximately two years is adequate (Eisenbud, following Tr. 4115, p. E-36-1).

The Applicant intends to undertake a pre-operational experimental radiation monitoring program approximately two years prior to Bailly N-1 start-up in order to determine background levels of radioactivity in the area of Bailly station which will then serve as a baseline for comparison with environmental radiation levels after the plant is in operation (S.E.R., p. 12; Reg. Staff Ex. 5, p. V-38;

Appl. Ex. 9, p. 7.1-1; Eisenbud, following Tr. 4115, p. E-36-1). The Applicant's pre-operational monitoring program will be done in cooperation with the Bureau of Sport Fisheries and Wildlife of the Department of Interior, and has been reviewed and approved by the Regulatory Staff and the Bureau (S.E.R., p. 13, Appendix G, pp. 158-162). Special attention is paid to the critical pathways of radioactive effluents through the food chain to man (S.E.R., pp. 12 and 13; Eisenbud, following Tr. 4115, pp. E-36-4 and -5). The program is shown in figure V-4 and is described in some detail in Table V-5 of the Final Environmental Statement (Staff Ex. 5, pp. V-39 and -40).

153. The Joint Intervenors, as part of their direct testimony, restated their contentions that at least six aquatic food chains and six terrestrial food chains should be sampled (Hanks, Olmsted and Baskin, following Tr. 8844, p. 2). No reason was offered for the requirement that six food chains be monitored in the Joint Intervenors' direct testimony, and on cross-examination it was indicated that the number six was chosen arbitrarily (Tr. 8846). The Joint Intervenors further contended that in order to provide a reference for the sampling of living organisms, it would be necessary to establish a baseline over a 10-year period. They also suggested studying the Alewife and the unsolved problem of why human mortality is higher when municipal water is soft. Finally, they suggested that as part of the development of the baseline, the Applicant should study the theory suggested by witness Hanks that there is a correlation of radiation doses and violent crime (Hanks, Olmsted and Baskin, following Tr. 8844, pp. 3-7).

154. The Board finds that the critical pathway method proposed by the Applicant is a well established and acceptable method and will provide sufficient assurance that the radiological impact of the plant is within expected limits. The Board is not persuaded that the pre-operational program need be extended beyond the practice in the industry

of a two-year period. The Joint Intervenors' suggestions of items to be studied to determine their baseline are found to be without merit. The Board finds that the Applicant's radiological program for the pre-operational phase, as approved by the Regulatory Staff, is acceptable. The operational radiological monitoring program will be addressed at the operating license stage of the project.

155. In Contention 65, the Joint Intervenors contend that the Applicant's monitoring program is deficient in that there is no commitment for continuing the monitoring program for a specific time into the future. This is contrary to the Applicant's commitment to conduct and continue throughout the lifetime of the plant a radiological program (Appl. Ex. 9, p. 7.1-1). The Regulatory Staff's witness stated that such devices were not available with the sensitivity and capability for measuring all types of radiation which are necessary to adequately characterize environmental radioactivity concentration (Essig, following Tr. 5427, p. 1; Tr. 5436). He stated that the preferred method for determining such concentration is sample collection followed by laboratory analysis. However, in the plant where higher concentrations of radioactivity will exist relative to the environs, he stated that such environmental devices would be utilized as part of Applicant's effluent monitoring and measurements program (Essig, following Tr. 5427, p. 1). Based on the information contained in the PSAR and on the Regulatory Staff's review of the sample sites and sample frequency selection being proposed by the Applicant, the Regulatory Staff has concluded that the contemplated environmental radiological monitoring program is adequate to protect the health and safety of the public (S.E.R., p. 13, Essig, following Tr. 5427, p. 1).

156. The Board agrees with the Regulatory Staff's assessment and finds the Applicant's proposed pre-operational environmental radiological monitoring program acceptable. The operational monitoring program will be amplified and further defined in the technical specifications for Bailly N-1 to be attached by the Director of Regulation to any operating license issued for the plant.

157. In Contention 37, the Joint Intervenors contend that the Applicant's biological monitoring program is inadequate and insufficient to provide a meaningful baseline for later comparison in order to detect the magnitude of adverse environmental effects from operation of Bailly N-1. Specifically, they allege that the inventory (particularly aquatic) performed by the Applicant in the Bailly area is cursory and often covers genera but not species and thus no meaningful baseline has been developed by the Applicant which would serve to ascertain the magnitude of later adverse effects. In Contention 65, they contend that the Applicant has made no commitment regarding the length of time the biological environmental program will be conducted and allege that the location of monitoring devices and frequencies of sampling are inadequate. A brief review of the chronology of the development of Applicant's proposed biological monitoring program is pertinent to a discussion of these contentions.

In the fall of 1970, the Applicant's consultant performed a limited series of aquatic and terrestrial studies in the area surrounding the Bailly sites. The results of these studies were recorded in the Applicant's environmental report filed March 1972 (Appl. Ex. 9, Section 5; Johnson, following Tr. 3915. p. E65-3). This limited information was reviewed in the Regulatory Staff's Draft Environmental Statement, dated July 1972, and was the basis of Joint Intervenors' Contention 37, submitted August 28, 1972. In the Regulatory Staff's Final Environmental Statement (Reg. Staff Ex. 5), it is stated:

> "Due to the paucity of preoperational sampling data thus far supplied by the Applicant, as well as the lack of a formal study plan, the Staff anticipates requesting considerable additional requirements for operational surveillance in the technical specifications for the operating license." (Staff Ex. 5, pp. V-26 and 27).

In addition, the Regulatory Staff recommended a number of conditions to be attached to any construction permit granted relating to a pre-operation environmental monitoring program (Reg. Staff Ex. 5, paragraph 8(a), (f) and (g), pp. iv-v). The Joint Intervenors' Contention 65 was admitted in March 1973. On June 29, 1973, long after formation of the pertinent Joint Intervenors' contentions, the Applicant introduced its proposed monitoring program which had been prepared by its consultant (Johnson, Attachment entitled "Preliminary Specifications for Ecological Monitoring Programs", following Tr. 3915). The presentation of this program as part of the Applicant's testimony during this proceeding was the first time this program had been submitted to the Regulatory Staff or the Joint Intervenors. The Regulatory Staff reviewed the proposed program and presented testimony indicating certain areas of concern relating to the proposed program; namely, frequency of sampling (Tr. 6441-44), the sampling of mammalian and bird populations (Tr. 6445-46), and the number and location of sampling sites (Tr. 6462-67). Also, the Regulatory Staff's witnesses pointed out specific changes or additions it believed necessary (Tr. 6468-69, 6475-76, 6476-77), and suggested the use of indicator organisms (Tr. 6468-6473).

158. The Joint Intervenors also presented testimony as to certain deficiences they felt were reflected in the proposed monitoring program (Tr. 8822-8888). While indicating serious reservation as to the adequacy of any monitoring program to afford protection to the environment and the health and safety of the public incident to construction and operation of the proposed Bailly N-1 plant, the witnesses on behalf of the Joint Intervenors stated that a minimal monitoring program should include: (1) radiological measurements by sensitive instrumentation against a properly established baseline; (2) representative sampling of live organisms against a properly established baseline; (3) collection, autopsy and testing of sick and dead organ-

isms against a properly established baseline; and (4) representative sampling of interdunal ponds and bog water chemistry and bottom sediments against a properly established baseline (Hanks, Olmsted and Baskin, following Tr. 8844, p. 1).

In its rebuttal case, the Applicant introduced an amended biological monitoring program (Johnson, following Tr. 9438, pp. 1-3, and Attachment "Specifications For Ecological Monitoring Programs . . ."). The program as amended resolved the concerns raised by the Regulatory Staff in its earlier testimony and was approved by the Regulatory Staff (Geckler, following Tr. 9558, pp. 1 and 2).

The Applicant's proposed biological monitoring program, as amended, includes aquatic and terrestrial monitoring. The area to be evaluated as part of the aquatic monitoring program includes Lake Michigan in the vicinity of the fossil fuel Units 7 and 8, the ash settling ponds and the natural ponds in the area adjacent to and east of NIPSCO's property including the Cowles Bog area. The program sets forth the sampling areas and the schedule of taking samples. Sampling of all categories will begin during the preconstruction phase and will continue on a monthly basis during the first year of construction, the second preoperational year and during the operational phase of Bailly N-1. Thus, the program will provide an evaluation of environmental conditions during each of the four seasons of the year and two years of baseline data prior to plant operation. The program provides for the collection of samples of water chemistry and bacteriology, phytoplankton, zooplankton, photoplankton and zooplankton plume entrainment samples, periphyton, benthos, submerged and floating macrophytes and fish (Johnson, following Tr. 9438, pp. 9-21 of "Specifications for Ecological Monitoring Programs . . ."). The terrestrial monitoring program is designed to monitor the plant and animal communities in the site area. It will include a general survey of

vegetation. The surveys will be conducted in seven named plant communities. During all phases of monitoring, qualitative evaluations will also be made within each plant community to determine the foliar effects of existing levels of airborne pollutants such as SO_2. The potential effects of salt deposition resulting from cooling tower discharges have been considered and soil samples will be analyzed in each plant community during all monitoring phases. Soil samples will be collected from each of the sampling locations for electrical conductivity analysis. Surveys will be conducted of birds (resident and migratory, game and nongame), mammals, reptiles and amphibians, and terrestrial invertebrates. Finally, soil types and their distribution in the vicinity of the site will be mapped during the preconstruction monitoring phase (Johnson, following Tr. 9438, pp. 22-23 of "Specifications for Ecological Monitoring Programs . . .").

159. The Board finds that the revised monitoring program proposed by the Applicant, which reflects many suggestions of the Intervenors and approved by the Regulatory Staff, together with the information already developed by the Applicant and the Regulatory Staff, is adequate at the construction permit stage to provide the environmental information necessary to monitor the environmental impacts that can be expected prior to fuel loading and to provide required pre-operational baseline data.

160. Concluding, the Board finds that the environmental impacts during the construction and operation of Bailly N-1 will be negligible.

7. *Other Environmental Matters*

161. The Board concludes that the Regulatory Staff's Final Environmental Statement adequately discusses: (a) irreversible and irretrievable commitments of resources; (b) adverse effects which cannot be avoided; and (c) short-term uses and long-term productivity (Reg. Staff Ex. 5,

pp. VII-1 through VII-2, VIII-1, and IX-1). The information relating to these three topics was taken into consideration in the Board's cost-benefit analysis of the proposed action.

C. *Impacts of Decommissioning*

162. In Contention 19, the Joint Intervenors contend that the Applicant has failed to state in adequate detail how or whether the plant can be decommissioned. Specifically, the Joint Intervenors allege that Applicant has given no clear explanation as to how it will decommission the plant, what will be done with the radioactive components of the plant, what the economic costs will be, and what effect decommissioning will have upon the environment and future development of the local area. They also assert that until such items are adequately resolved, an appropriate analysis of risks and benefits associated with the operation of Bailly N-1 cannot be made. Joint Intervenors Contention 20 related to the Applicant's financial ability. The Board rejected the portion of this contention alleging that the Applicant was not financially qualified to receive a construction permit but agreed to receive evidence on that aspect of the contention relating to the cost of decommissioning and dismantling the proposed facility in light of the independent cost-benefit analysis it must make (Environmental Prehearing Order of the Atomic Safety and Licensing Board, dated November 15, 1972, paragraph 3).

163. The record reveals that technology required to accomplish decommissioning of the proposed Bailly nuclear facility exists today (Tr. 1759, 1763, 1986). The Applicant made an analysis of the costs for decommissioning the proposed plant at the end of its useful life; namely, 2.9 million for entombment and approximately 20.4 million by dismantlement (McClusky following Tr. 2883, pp. E-19-20-3 and -4; Tr. 2934-35, 2938-43, 2959-65, 2068-80, 2982-85, 3003,

3013; Appl. Ex. 15). The Regulatory Staff estimated that the cost would range from $3-30 million, depending upon the method selected (Tr. 1761, 1786-92). Using either figures, the cost of decommissioning would amount to only a small fraction of the cost of constructing and operating Bailly N-1 (McClusky, following Tr. 2883, p. E-10-20-5; Tr. 1762).

164. Since we have previously determined that the Applicant is financially qualified to construct and operate the proposed nuclear facility costing hundreds of millions of dollars, we find no basis for assuming that the small, incremental decommissioning costs will impair the financial ability of the Applicant to decommission Bailly N-1 in a safe manner consistent with protection of the environment (McClusky, following Tr. 2883, pp. E-19-20-1 through -6).

165. Mr. Herbert P. Read, a witness for the Joint Intervenors, testified that there is no precedent to accurately estimate the full cost of decommissioning by the complete removal method (Read, following Tr. 9218, p. 1). And in asserting this, he questioned the methods and figures utilized by the Applicant to quantify prospective decommissioning costs (Read, following Tr. 9218).

He considered the entombment method unacceptable stating:

> "Entombment . . . would constitute a continuing hazard to the environment and to the public health and safety because there is no assurance that radioactive materials would not eventually leak out into the air or ground water during the long period of time that the materials in the plant's inventory remain active . . ." (*Id.*, p. 1)

In addition, he stated:

> ". . . There is no assurance that the Applicant has the ability, financial or otherwise, to maintain surveillance over the entombed plant for the hundreds or thousands

> of years that would be required for the radioactivity of the inventory to decay to a safe level (Id., p. 1)."

166. The Board is equally concerned regarding entombment as a means of decommissioning.

The cost of dismantling, however, appears to be in the range of economic feasibility. The Board is also of the opinion that absolute quantification cannot be expected where the anticipated event will not occur until a substantial time in the future (probably 30 to 40 years from now in the Bailly situation), and where changing technology may influence the methods and costs for decommissioning. We believe the Applicant's substantial efforts in evaluating the costs involved in decommissioning the proposed Bailly N-1 meet the standards required under NEPA. Cf. *Consumers Power Company (Midland Plant, Units 1 and 2)*, ALAB-123, RAI-73-5 331 at p. 351. Accordingly, we reject the Joint Intervenors' environmental Contentions 19 and 20.

IV. Federal Water Pollution Control Act Amendments of 1972 [13]

167. In a letter dated March 8, 1973, revising an earlier letter of February 20, 1973, the Stream Pollution Control Board of the State of Indiana certified that the proposed Bailly N-1 will comply with that State's applicable water quality standards, and further certified that Indiana has no applicable effluent limitations promulgated pursuant to Sections 301, 302, 306 and 307 of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA) (Appl. Ex. 10, 10A). The record further reveals that the water quality standards of Indiana, pertinent to this proceeding, have been approved by the United States Environmental Protection Agency (Appl. Ex. 36). In its certifying letters, the State of Indiana made it clear that its approval of the

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[13] Public Law 92-500, 56 Stat. 816 (1972).

proposed Bailly nuclear facility was conditioned on meeting certain requirements which are outlined in these letters.

168. In view of Indiana's positive certification as to water quality standards and its further certification that there are no applicable effluent standards, we conclude that issuance of a construction permit would not violate the provisions of FWPCA. *Washington Public Power Supply System* (Hanford 2 Nuclear Power Plant, ALAB-113, RAI-73-10 831 at pp. 842-43). However, in the absence of a positive certification pertaining to effluent standards, the Board is under a NEPA obligation to review fully the environmental effects that Bailly may create with respect to the waters within its vicinity as a consequence of its construction and operation. Section 511(c)(2)(A) of FWPCA imposes no restraints on our obligations in the case of a negative certification respecting effluent standards (*Id.* at p. 842, footnote 95).

169. In light of a very recent letter from the Indiana Stream Pollution Control Board to Mr. Stuart Treby (counsel for the Regulatory Staff in this proceeding), dated March 11, 1974,[14] which clarifies that State's two earlier certifying letters, the instant Board finds no Indiana conditions which must be incorporated in any Commission construction permit. Cf. *Port Authority of the State of New York, et al., (James A. FitzPatrick Nuclear Power Plant, Unit 1)*, ALAB-173, RAI-74-1 45 51.

V. Need for Power

170. The thrust of Joint Intervenors' Contentions 39 through 42 is that the Applicant has failed to demonstrate the need for the power which would be furnished by Bailly N-1. In particular, Joint Intervenors contend that the Applicant has used outmoded and incorrect forecasting methodology in its projections of load demand, especially in

[14] Attached to end of this Initial Decision as Appendix I.

relying on statistics during the period 1960-1970 in analyzing needs for power for the period 1970-1980 (Contention 40); that the demand of steel mills and projected industrial development at the Port of Indiana has been greatly exaggerated (Contention 41); and that the electric power needed is available from other neighboring utilities or regional power pooling systems (Contention 39). Further, as part of Contention 38, Joint Intervenors have alleged that there are alternatives to construction of Bailly such as conservation of electrical power through changes in the rate structure; elimination of wasteful use of power; upgrading the efficiency of Applicant's existing fossil fuel plants; construction of a nuclear plant as a joint venture outside of Applicant's service area; and research and development of alternative methods of generating power other than nuclear or fossil fuel. Finally, Joint Intervenors allege that Bailly N-1 would diminish the reliability of Applicant's system and lead to waste in the form of large spinning reserves (Contention 42).

171. The Board considers the "Need for Power" one of the most crucial issues in this hearing. In balancing alternatives, as required by NEPA, the chief benefit of a power plant is the electricity it produces. If that electricity is not needed, then the benefit side of the balance would have little weight.

172. The need for a power plant at a given future date depends upon four factors: (1) the projected electrical demand; (2) the power reserve required to assure system reliability; (3) the scheduled power plant additions to the system; and (4) the purchase of power from neighboring utilities.[15] We will now explore the question of reserve requirements.

173. In order to fulfill its responsibility to its customers, the Applicant must provide the generating capacity and

[15] This particular point will be more fully discussed *infra* in the section on alternatives.

other facilities required to assure adequate and reliable electric service (Hiple, following Tr. 4345, p. E-39-1). This requires reserve capacity to provide continuity of service in the event of a shut down of generating units for maintenance, delays in operation of generating unit additions, and other contingencies beyond Applicant's control (Hiple, following Tr. 4345, pp. E-39-2 and -3; Beyer, following Tr. 5728, pp. 2-3). Applicant intends to maintain at least a 15% reserve level, recognizing that values will vary with unit additions and timing (Hiple, following Tr. 4345, p. E-39-3). The Federal Power Commission (FPC) has found that many systems plan for a reserve capacity of 15 to 25%. Reports submitted by the East Central Area Reliability Coordination Agreement (ECAR), of which the Applicant is a member, show that reserves of 20-25% are necessary to provide adequate reliability of the ECAR system (Beyer, following Tr. 5728, pp. 2-6).

174. Joint Intervenors' witness Mr. Reed questioned the need for a 15% reserve in that peak loads are of short duration, that power can be purchased for short term needs, and that reduction of consumption can be achieved on a voluntary basis (Reed, following Tr. 7116, pp. 9-10). The witness has no expertise in electric power systems and did not present any evidence that the measurements he proposed would be practicable on the NIPSCO system. The Board concludes that the Applicant and the Regulatory Staff have made a good cause for a minimum reserve of 15%.

175. The greatest uncertainty in assessing whether a power plant will be needed at a given time in the future (e.g. Bailly in 1979) lies in projecting the growth in demand for electric power for a period of 5 to 6 years in the future.

Applicant's technique for forecasting demand consists primarily of analyzing historical trends and extrapolating future demand. Components and characteristics of present

loads are analyzed, past trends in load make-up and growth reviewed, and rational judgements made as to future trends of growth such as actual information from industrial customers, expected changes in residential uses, population changes, and developments within the service area (Almasy, following Tr. 4350, p. E-40-1). The projected load consists of two components: general (residential, commercial, and small industry) and major industrial. The latter projection is based primarily on information obtained directly from the customers involved (Tr. 4472, 4477, 4510-12, 4589-95; Appl. Ex. 20).

Applicant's forecasting methods have achieved reasonable accuracy in the past. There is a great economic incentive to predict peak loads accurately in order to achieve the financially optimum schedule for adding new power units. From 1960 through 1972, the cumulative percentage of deviation of the forecast peak demands from the actual peak demand is 9.67 (Almasy, following Tr. 4350, p. E-40-2). For the past 17 years, the annual average growth in demand upon the Applicant's system has been 8.09%; for the past 11 years, 7.63% and for the past 5 years, 7.7%.

176. Based upon the historic increases in demand, plus information on the known increases in contract power to some major industries, the Applicant presented a table of projected increases in demand, year by year from 1972 to 1981 (See column 2, Table X-1, testimony of Hiple, following Tr. 4345, p. E-39-21). The average rate of increase is approximately 8% per annum for the period 1973 to 1979. (Table X-1 of the Regulatory Staff's FES was based on earlier projections by the Applicant and no longer represents the Applicant's forcast.)

177. The Joint Intervenors' witness Reed (following Tr. 7116, pp. 1-5) pointed out that the Applicant's earlier projections for power demand in 1972 was 20% over the 1971 actual power peak (See Table X-1 of the FES). The Applicant's revised projections were based on a 1972 ac-

tual peak of 1654 Mw or 7% over the 1971 peak. However, the revised tables show a 1973 projected power peak of 1935 Mw of 17% over 1972. The actual peak demand was 1800 Mw. Mr. Reed objected justifiably that this amounts to front-end loading. The Applicant has stated that its projections are revised yearly to take into account the actual experience. As will be shown later, the revision of the 1973 base power to 1800 Mw in place of the 1935 Mw of Applicant's Table X-1 does not postpone the need for an additional unit for more than a few months.

The Joint Intervenors' witness Reed (following Tr. 7116, pp. 10-14) presented testimony to the effect that "Prediction of Power consumption beyond 1981, based on conditions of today are highly uncertain." The Board agrees with that statement, and it will discuss this comment later. The witness further pointed to a number of energy conservation measures that could "result in flattening the curve of power consumption."

As possible energy conservation measures, Mr. Reed mentioned that "architectural designers can and will incorporate energy conservation into the buildings of the future." He also pointed out that the Office of Emergency Preparedness has published two studies on the potential for energy conservation; that multifamily dwellings will use less power than single family dwellings; that higher power cost will reduce the demand for power (Reed, following Tr. 7116, pp. 10-14). The Board agrees with these statements, and has directed many questions at the Applicant's and Regulatory Staff's witnesses along these lines. However, we are faced with the problem of quantifying what effects energy conservation will have on the Applicant's projected demands. The Joint Intervenors' witness could not assist us.

178. In order to maintain an adequate reserve, power generation units and power purchase contracts must be scheduled well into the future. Applicant's Table X-1

(following Tr. 4345, E-39-21) shows the scheduled peak capacity of the present and planned units and the firm purchase contracts with neighboring systems. The total available peak power is listed in column 5 and the available reserve capacity in column 7. It shows that the reserve capacity would be only 5.4% in the summer of 1978.

The Applicant's Table X-1 was revised as of May 8, 1973, which means the Regulatory Staff's table in the FES is no longer correct. Since this occurred during the course of the hearing, there was understandably some confusion on the part of the other parties concerning the Aplicant's arguments on the need for power. Joint Intervenor prepared a number of Tables which purported to show that the date Bailly N-1 would be needed was incorrect. They used the Applicant's revised (and reduced) projection for power demand, but the unrevised projection as to the date that new generating units would come on line (Reed, following Tr. 7116, tables J-1 through J-5). He also assumed much larger blocks of purchased power than the Applicant testified that it would be able to contract for (Hiple, following Tr. 4345, pp. E-39-4 and -5; Tr. 4988-94). There is no factual basis for the Joint Intervenors' assumptions. Under these circumstances, the Board rejects the Intervenors' propose finding "that the Applicant can meet its projected load demands with at least a 15% reserve through 1980 without the Bailly nuclear plant or equivalent coal-fired capacity."

179. Although the evidence clearly indicates that a generating unit of the size of Bailly will be needed in 1978, the Board was concerned that the petroleum shortage and the increased emphasis on conservation of electric energy might result in postponing the need for Bailly, and that the situation might have changed since the close of the hearing on November 14, 1973. Accordingly, the Board directed all parties to address the question as to whether the hearing should be reopened to take further evidence on the need for power. The Applicant and the

Regulatory Staff argued that the record was adequate; that energy conservation had been explored during the evidentiary hearing; and that petroleum shortages could lead to increased demands for electricity.

The Joint Intervenors' position is that the record of the hearing is already clear in showing that Bailly will not be needed before 1981. We have addressed this point above.

180. During oral argument, the Applicant stated that the peak load for 1973 was 1800 Mw rather than the 1935 Mw used in their revised projection Table X-1. It also stated that the power demand for the latter months of 1973 was about 7% rather than 8.5%. This led the Board to inquire what the effect would be of using the smaller 1800 Mw figure as the base point and using a smaller growth rate. Since this is just a matter of arithmetic, the Board decided to check the answers presented at the hearing.

We calculated the amount of reserve power that would be available each year from 1973 to 1981 using the Applicant's figures for purchased power and the available generating capacity *not* including N-1. We made a table showing reserve capacity vs. time for three different rates of growth using 1800 Mw in 1973 as the starting point in each case. With a rate of growth of 7-½% a year, somewhat less than the Applicant used, we find that the reserve capacity is reduced to 11% in 1978 as compared with the Applicant's 5.4% for that year. With a 7% rate of growth, the reserve capacity is down to 10% in 1979, showing that even with a slower rate of growth than Applicant assumed, N-1 would still be needed in 1979. We also calculated the effect of a 5% rate of growth; in that case the reserve would fall below 15% (i.e. 10%) in 1980. So even a very much smaller rate of growth postpones the need for N-1 by only 1 year.[16]

[16] Board's table is attached to end of this Initial Decision as Appendix II.

181. During oral argument on proposed findings, the Applicant asserted that in view of the inevitable uncertainties on growth rate and construction schedules, it was much better to have a plant come on line before it is needed rather than after. Excess capacity can frequently be sold if available; older, less efficient, plants can be shut down. However, inadequate capacity can result in severe hardship to the community being served (Oral argument, Tr. p. 32). We are impressed by that line of reasoning.

182. The Applicant summed up its position concerning reopening the hearing (Tr. pp. 226-238 (February 19, 1974)) and asked that the Board consider what facts could be brought to the hearing that would be convincing that Bailly would not be needed until considerably after 1979. The Board is impressed that in view of the current rapidly changing social, economic and political conditions, as for example, the disruptions in our society brought about by the sharply rising cost of petroleum, there are no firm bases for making other more definitive projections for power demand for the future than have been made available to us, and, hence our judgements are based on the information in the record. Moreover, if these projections lead to reserves greater that the 15% target, we believe this is a lesser cost than the inability of the Applicant to meet the needs for power at that time. To deny a license as a result of speculative possibilities as to future demands is not reasonable. Our position is supported by a quotation from the AEC Memorandum and Order of January 24, 1974, in the *Consumers Power Co.* case, Docket No. 50-329, 50-330:

> " . . . Furthermore, the impact of proposed energy conservation alternatives on demand must be susceptible to a reasonable degree of proof. Largely speculative and remote possibilities need not be weighed against a convincing projection of demand. Here, as with many other issues under the National Environ-

mental Policy Act of 1969, a rule of reason applies..." (RAI-74-1 p. 24)

183. In view of the foregoing testimony and argument, we conclude that the present record is adequate to establish a power need for the proposed Bailly generating facility.

VI. Alternatives to the Proposed Action and the Cost-Benefit Analyses

184. The issue of alternatives in this proceeding is a significant area of controversy among the parties. The Joint Intervenors differ sharply with the Applicant and the Regulatory Staff on this subject. Agency environmental reviews, impact statements, and environmental responsibilities have been the subject of frenquent court and Commission review. In order to more fully understand and appreciate the reasoning for our findings on alternatives, *infra,* we deem it appropriate to discuss the decisions which focus on Agency responsibilities or obligations under the National Environmental Policy Act of 1969 (NEPA).[17]

185. Prior to enactment of NEPA, the Commission held, and that position was sustained on appeal, that it had neither the responsibility nor the authority to consider environmental effects in a licensing proceeding exclusive of those relating to health and safety. *State of New Hampshire v. Atomic Energy Commission,* 406 F. 2d 170 (1st Cir. 1969), *cert. denied* 395 U.S. 962 (1969). It was only with the event of NEPA that environmental obligations were imposed on the Commission, as well as upon other Federal Agencies. NEPA requires the preparation and submission of, among other things, a detailed environmental statement. In enacting NEPA, Congress also directed the Agencies to consider environmental risks

[17] 42 U.S.C.A. 4321, *et seq.*

incidential to resonable alternative courses of action. *Natural Resources Defense Council, Inc. v. Morton,* 458 F. 2d 827 (D.C. Cir. 1972). We perceive the passage of NEPA as a Congressional intent to provide an efficient apparatus wherein Agencies would give considerable thought to environmental values prior to making that decision which would profoundly affect those values for generations to come. Evidence of this intent, we believe, is shown by the manner in which NEPA is structured. The requirement of an impact statement and the inclusion therein of discussions on alternatives and with respect to a cost-benefit analysis of the proposed action are indicative of this Congressional concern for the preservation of the environment.

186. The courts have made it abundantly clear that the environmental effects of alternatives under NEPA need not be exhaustive. All that is required is that the information be sufficient to permit a reasoned choice of alternatives. A rule of reason is implicit. *Natural Resources Defense Council, Inc. v. Morton, supra;* Cf. *Calvert Cliff's Coordinating Committee, Inc. v. AEC,* 449 F. 2d 1109 (D.C. Cir. 1971); see *Consumers Power Company (Midland Plant, Units 1 and 2),* ALAB-123, RAI-73-5 331 at pp. 351-352 (May 18, 1973). In addition, the Appeal Board has ruled that NEPA does not impose minimal environmental standards which must be satisfied prior to the granting of a license. *Maine Yankee Atomic Power Company (Maine Yankee Atomic Station),* ALAB-161, RAI-73-11 1003 at 1007 (November 30, 1973). In this regard, the Appeal Board stated the following:

> "NEPA does not impose minimal environmental standards which must be satisfied as a condition precedent to the licensing of any reactor. *To the contrary, consistent with the provisions of NEPA, a particular reactor might be licensed even if it were found that its construction and/or operation would have a serious adverse environmental impact.* The purpose of the

> cost-benefit analysis called for by NEPA is to identify each significant environmental cost and to determine whether, all other factors considered, on balance the incurring of that cost is warranted. This determination necessarily involves the scrutiny of many factors; among them, offsetting benefits, available alternatives, and the posible means (and attendant costs) of reducing the environmental harm." (emphasis added) (*Id.* at p. 1007)

In light of the foregoing, we now proceed to consider: (1) the reasonable alternative to the proposed action; (2) the cost-benefit analysis of the alternatives; and (3) the cost-benefit analysis of the proposed action.

A. *Non-nuclear Alternatives*

187. The Applicant and the Regulatory Staff have considered other alternatives to the proposed nuclear unit, such as geothermal energy, magnetohydrodynamic generation, solar energy, nuclear fusion, hydroelectric power and pumped storage (Bohn and Criner, following Tr. 4708, p. E-38-1; Appl. Ex. 9, § 8.4.1.2, *et seq;* Beyer, following Tr. 5728, § G). These alternatives are either unavailable in Applicant's service area and/or not viable economically or technologically (Appl. Ex. 9, pp. 8.4-4 to 8.4-5; Beyer, following Tr. 5728 § G). In addition, both the Applicant and the Staff considered natural gas or oil as a fuel, including their use in combustion turbines, diesel generators, and combined cycle plants (Appl. Ex. 9, pp. 8.4-5 to 8.4-9; Bohn and Criner, folowing 4708, p. E-38-1; Reg. Staff Ex. 5, p. XI-3). Supplies of fuel oil and natural gas appear to be insufficient for the base-load generation contemplated by Applicant (Appl. Ex. 9, pp. 8.4-5 to 8.4-8; Reg. Staff Ex. 5, p. XI-3).

The use of coal as a fuel is the only viable fossil fuel alternative (Appl. Ex. 9, p. 8.4-9; Bohn and Criner, following Tr. 4708, p. E-38-8; Reg. Staff Ex. 5, p. XI-3). However, the economic and environmental costs of a coal-fired plant is significantly higher than for a nuclear powered facility (Bohn and Criner, following Tr. 4708, pp. E-38-8 to 9; Appl. Ex. 9, p. 8.4-10; Reg. Staff Ex. 5, pp. XI-3-4).

188. In view of the foregoing, and the evidence in the record, we conclude that the nuclear power contemplated for Bailly N-1 is preferable to the other fuels from an economic and environmental consideration.

B. *Alternative Cooling Systems*

189. A number of alternative cooling systems have been considered. Once through cooling is not permitted by state law (Regulation SPC 4-R; see pp. C-2 and C-3 of the Reg. Staff Ex. 5; Bohn and Criner, following Tr. 4708). Cooling ponds, spray ponds, and spray canals have been eliminated in view of adverse environmental effects and limited land area at the Bailly site (McFarlane, et al., following Tr. 6192; Tr. 6211-15, 6286; Appl. Ex. 9, Sec. 8.4.3.1.3; Reg. Staff Ex. 5, p. XI-4). Dry cooling towers are not practical considering the present state of the art (McFarlane, et al., following Tr. 6192). Mechanical draft cooling towers were considered and rejected because of space limitations, fogging and icing potential (Bohn and Criner, following Tr. 4708, pp. E-38-3 to -5), noise (Tr. 4728-29), and excessive drift and salt deposition (Tr. 6240). The height of mechanical draft towers is much less than natural draft towers and would therefore be less visible from the National Lakeshore (Reg. Staff Ex. 5, pp. XI-4 and 5; McFarlane, et al., following Tr. 6192, pp. 8-10; Bohn and Criner, following Tr. 4708, p. E-38-4). On balance, we conclude that natural draft towers are considerably better than mechanical draft towers from the environmental effects point of view.

Hybrid cooling towers are lower than natural draft towers and would prevent less visible intrusion. They are intermediate between natural draft and mechanical draft from the standpoint of fogging, icing, and drift.

No hybrid cooling towers have been built in the United States, and they might present operating problems in northern climates (Reg. Staff Ex. 5, pp. XI-4 and -5; McFarlane, et al., following Tr. 6192, pp. 5, 7-9, 11). In view of the uncertainties with hybrid cooling towers, the Regulatory Staff concluded that it is not a practical alternative (McFarlane, et al., following Tr. 6192, p. 6). We agree with this conclusion.

The Joint Intervenors have urged that one of the alternative cooling methods be adopted in as much as any of the other alternatives would offer less visual pollution than natural draft towers (refer to our earlier discussion herein on visual pollution). As is evident, the Joint Intervenors did not present any positive evidence on alternate cooling methods.

190. Upon review of the record, the Board concludes that a natural draft cooling tower is, on balance, the best way of dissipating the heat from proposed Bailly N-1.

C. *Purchasing of Electrical Power As An Alternative*

191. The record reveals that other neighboring utilities do not have excess generation capacity available for long-term firm power contracts (Hiple, following Tr. 4345, pp. E-39-14 through -16; Tr. 4433-37). The present contracts in force with other companies for emergency power cannot be considered as a replacement for installed or firm capacity (Hiple, following Tr. 4345, pp. E-39-12 and -13).

192. Our review of the entire record indicates that the purchase of electrical power from other utilities is not a reasonable alternative to the proposed action in meeting the electrical needs of the Applicant for the late 1970's and early 1980's.

D. *Alternative Sites*

193. The most significant issue presented to the Board in this proceeding has been the question of alternative sites. The Board is impelled to consider this matter as required by NEPA and also in response to Joint Intervenors' Contention 68, which alleges an "Unsupported Cost-Benefit Conclusion" on the part of the Regulatory Staff.

Prior to the beginning of the hearings, the Applicant and Regulatory Staff considered two other Lakeshore sites within the Applicant's service area, namely the Mitchell site near Gary, Indiana, and the Michigan City site (Bohn and Criner, following Tr. 4708, pp. E-38-10 and -11; Reg. Staff Ex. 5, p. XI-6). Both alternate Lakeshore sites were rejected, primarily for reasons of population density adjacent to the site (Id.). The Joint Intervenors' witness Reed (testimony folowing Tr. 7813) advocated the Mitchell site over the Bailly site but presented no evidence to show that it would be acceptable under Commission Reg. 10 CFR Part 100.

Based upon our review of the entire record, we agree that the Applicant and the Regulatory Staff were justified in concluding that the Bailly site was the best of the Lakeshore sites.

194. In 1971, prior to the hearings, the Applicant also considered several inland sites along the Kankakee River for posible location of fossil fuel plants and selected one of them, the Schahfer site as best (Bohn and Criner, following Tr. 4708, pp. E-38-15 and 16). The Regulatory Staff considered these sites as possible alternate sites for Bailly N-1, but rejected them partly for reason of limited water supply (Reg. Staff Ex. 5, p. XI-7) and partly for economic and environmental costs associated with the development of a new site as compared to an already developed site such as Bailly (Reg. Staff Ex. 5, pp. 8-13).

During the environmental phase of the hearings, the Board learned that the Applicant had begun the construction of a fossil fuel plant on the Schahfer site (Bohn and Criner, following Tr. 4708, pp. E-38-38 through -51). Since this was no longer a virgin site, it appeared that many of the aforesaid costs (e.g. transmission lines) and environmental impacts of site preparation were not applicable and a new evaluation would be desirable. Therefore, the Board directed the Regulatory Staff to prepare a new cost-benefit study comparing the Bailly and Schahfer sites (Tr. 6729-30). The Regulatory Staff responded by presenting an analysis which compared in detail the cost-benefit factors associated with the two sites (Reg. Staff Ex. 8; Tr. 6940-6985). Their conclusion was that, when only environmental matters were considered, the Bailly site was superior but not overwhelmingly so (Tr. 6982). The Board agrees with this conclusion.

195. While it is true that the Schahfer site is surrounded by a lower population density, and, therefore, the potential risk is less at Schahfer, the record, nevertheless, discloses that in cases of class 1 through class 8 accidents the exposure of people to radiation doses at either site will pose no significant risks (Reg. Staff Ex. 5, table VI-2). As to risks which may be encountered as a consequence of a class 9 accident, the Regulatory Staff introduced testimony that the probability of such an accident was so small that the environmental risk was also small (Reg. Staff Ex. 5, p. VI-2). Regardless, we concede that no matter how small is the risk, we must include it in our balancing. In respect to potential risk to population, the Schahfer site would be a plus. However, the Joint Intervenors failed to controvert the testimony on the extremely low probability of a class 9 accident with any substantial, probative evidence. Therefore, the Board concludes because of the improbability of a class 9 accident with its concomitant risks, no significant weight can be given to the low popu-

lation density surrounding the Schahfer site in its cost-benefit analysis.

196. The cost of construction at the two sites are not significantly different (Reg. Staff Ex. 8). The one factor that tips the scale overwhelmingly in favor of the Bailly site is the delay that would be associated with moving to a new site. The Applicant has estimated that a 4-year delay would be entailed by the change in location; the Regulatory Staff estimated a minimum of 18 months to 2 years (Reg. Staff Ex. 8D; Bohn and Criner, following Tr. 4708). Applicant's witnesses Loomis and Criner made a convincing argument for a minimum of 4 years delay (following Tr. 10111, pp. 6-7).

197. In view of our findings on need for power, *supra*, that a power generating plant equivalent to Bailly will be needed in 1979, and that there are no cumulative, significant environmental advantages in the alternative sites, we must conclude that the application in this proceeding can not be denied on the basis that Schahfer or any other site is more appropriate than Bailly.

198. Summarizing, in independently balancing the cost-benefit factors, *inter alia*, the need for power, environmental impacts, alternatives to the proposed action, the Board concludes that the benefits flowing from Bailly N-1 exceed the environmental costs, and it would be in the public interest to authorize construction of said nuclear facility.

VII. Authority of the Commission To Issue Construction Permit

The Joint Intervenors have introduced a number of contentions which collectively can be summed up as a challenge to the legal authority of the Commission to issue a construction permit (Contentions 21, 22, 23 and 29). In Contention 23, they include the further averment that the construction of the proposed Bailly nuclear facil-

ity would amount to an unlawful taking of Joint Intervenors' property in violation of the United States Constitution (see Joint Intervenors' specifications of August 28, 1972).

A. *Unlawful Taking of Property*

199. We summarily dismiss the legal contention that favorable action on the application will be tantamount to taking of property without due process of law—although this allegation is not fully spelled out in Contention 23. Initially, it presupposes that substantial environmental harm to surrounding properties will occur as a result of construction and operation of Bailly N-1. As we earlier noted herein, the substantial weight of evidence supports a contrary conclusion, namely, that it is unlikely that significant environmental effects will emanate from Bailly N-1. Secondly, the Commission's licensing procedure merely authorizes a license, and it does not in any manner deal with the property rights of individuals. The Applicant is not relieved of any obligation under State and local laws respecting the rights of neighbors. *State of New Hampshire v. AEC*, 406 F. 2d 170, 176 (1st Cir. 1969), *cert. denied* 395 U.S. 962 (1969). See also Section 9 of Pub. L. 89-761.

B. *Indiana Dunes National Lakeshore Act* [18]

200. Joint Intervenors assert that an affirmative exercise by the Commission of its licensing authority in this case would be contrary to the intent of Congress "embodied in the Indiana Dunes Lakeshore authorization and subsequent appropriations for land acquisition." (Contention 21)

We agree that the primary purpose of the introduction and enactment of the Indiana Dunes National Lakeshore

[18] Pub. L. 89-761 (1966); 80 Stat. 1309.

is to preserve certain unique qualities of the Indiana Dunes. These include scenic, scientific and historic values. In furtherance of this endeavor, the Congress authorized the Secretary of the Interior (Secretary) to acquire lands, waters, and other property by donation, purchase with donated or appropriated funds, exchange or otherwise.[19] In addition, Section 5(b), in effect, authorized the Secretary to promulgate regulations barring commercial or industrial uses within the boundaries of the Lakeshore.

After a careful scrutiny of the Act and the legislative history relating thereto, we have been unable to discern any intrinsic language supportive of the Joint Intervenors' view of the law. The Act contains no language suggesting that the Secretary be provided with the authority to bar industrial growth outside the immediate perimeters of the National Lakeshore. Nor is there language wherein it may be inferred that Congress intended to reduce or eliminate altogether existing industrial operations outside the National Lakeshore. On the contrary, the legislative history appears to support an opposite result, namely, that industrial growth should go "hand in hand" with environmental protection. Supportive of our analysis is the fact that in order to surmount previously successful efforts in preventing the National Lakeshore authorization, the Congress reduced the area to be included therein. In addition, Congressional supporters, in effect, gave assurances that acceptance of the National Lakeshore would not be a prelude to the elimination of industrial growth.

Congressman Pucinski, in support of the bill, pointed out:

> "Well, I say to you that this national park will certainly play a vital role in not only helping the industrial development of the area, but at the same time would prevent some of the pollution problems with

[19] Section 2(a) of the Act; 16 U.S.C.A. 460 U-1 (1973 Supp.).

which we are faced." (Cong. Rec., p. 25075, 89th Cong., 2d sess.)

Representative Aspinall, also in favor of the Indiana Dunes National Lakeshore, had the following comment:

> ". . . In recognition of the controversy between those, living in the area, who desire industrial development and those desiring to protect this area for its natural and recreational values, the committee attempted to find a 'middle ground.' Trying to resolve the dispute, the committee concluded that most of the controversial detached areas should be deleted; thus reducing the size of the proposed lakeshore by slightly more than 2,000 acres. This has the effect of deleting the so-called Inland Steel property—which incidentally, due to a clerical error in the report, involves only 852 acres rather than 3,398 acres. . . ." (Cong. Rec., p. 25067, 89th Cong., 2d sess.)'

Another supporter commented that "there is plenty of room in that area for industrial development." (Congressman Roush, Cong. Rec., p. 25072, 89th Cong., 2d sess.)

201. We conclude that the proposed Bailly nuclear facility is a form of industrial expansion not restricted by the Indiana Dunes National Lakeshore Act, except to the extent where its operating activities may cause damage to the property owned by, or under the jurisdiction of, the Secretary of the Interior and, thus, subject to the common law tort principles. Weighing heavily in this finding is our determination that it is highly unlikely that environmental effects will occur that will physically damage the Indiana Dunes National Lakeshore. *Universal Interpretive Shuttle v. Washington Metropolitan Area Transit Commission, et al.*,[20] *and Udall v. Washington, Virginia and Maryland Coach Co.*,[21] cited by the Joint Intervenors in

[20] 393 U.S. 186 (1968).

[21] 398 F. 2d 765 (D.C. Cir. 1968).

their brief with respect to "Contentions 21, 22 and 20," dated January 25, 1974, appear to us to be irrelevant, and we give no weight to these cases.

C. *Burns Waterway Harbor Authorization Legislation*[22]

202. The language in the legislation pertinent to this proceeding is stated as follows:

> ". . . The State of Indiana shall furnish assurance satisfactory to the Secretary of the Army that water and air pollution sources will be controlled to the maximum extent feasible in order to minimize any adverse effects on public recreational areas in the general vicinity of the Harbor. . ." (U.S. Code Congressional and Administrative News, vol. 1, p. 1095, 89th Cong., 1st sess., 1965)

Our reading of the legislation manifests the observation that no obligations were imposed on sister Federal Agencies. The responsibility to reduce air and water pollution sources under that legislation was placed solely on the shoulders of the State of Indiana. The authorizing of a license in this proceeding does not eliminate that duty. In addition, our earlier findings on the lack of adverse environmental effects are dispositive of Joint Intervenors' Contention 29.

203. Summarizing, we see no substantial, probative evidence to justify a finding that the granting of a construction permit here would run afoul of the Burns Waterway legislation.

D. *The Department Of Interior*

204. The Secretary of the Interior testified that his Department opposed the issuance of a construction permit for Bailly N-1 for a number of reasons. These included,

[22] Pub. L. 89-298; 79 Stat. 1073, authorizes a number of public work projects, including Burns Waterway Harbor.

inter alia, (1) environmental harm would ensue from the proposed facility's construction and operation (Reed, following Tr. 7528, p. 9; Tr. 7534, 7544, 7608); (2) a construction permit would flout a Congressional mandate (Reed, following Tr. 7528); and (3) issuance of a permit would subvert the Department's managerial responsibilities and restrict its flexibility as well as that of the National Park Service (Tr. 7545-46, 7566, 7588, 7604, 7608). The Secretary further advised that he had no objections to Bailly N-1 on health and safety grounds; he left those matters to the Atomic Energy Commission (Tr. 7597, 7608).

205. In the course of advising us as to the scope of the cost-benefit analysis, both the Applicant and the Regulatory Staff had stated that we should accord the Department of Interior the same treatment that is given to any individual who happens to be a neighbor of a proposed nuclear facility (Oral Argument on Proposed Findings, February 19, 1974, Tr. 171-172, 244 (line 6 of this page should be corrected to change "CBA" to "cost-benefit-analysis")). We reject such a notion.

The Department has been directed by Congress to protect on behalf of this nation an environment with special qualities—Indiana Dunes National Lakeshore—just as we have been entrusted with a public duty to license nuclear power plants under safe conditions. Under NEPA, we would be remiss in our responsibilities if we were to deprecate this important role of the Department by aliking it to that of an individual neighbor.

Therefore, we believe that the two Agencies must be accorded "equal partner" status with distinct, but complementary mandates; the Atomic Energy Commission to encourage the supply of adequate electrical energy *under proper safeguards,* and the Department of Interior to protect special environmental landmarks. Consequently, as the Board indicated during the course of the hearing, careful consideration must be given to the policies of the

Department regarding the uses of the Indiana Dunes National Lakeshore and how the proposed Bailly action affects them (Tr. 7543).

206. As is evident from our earlier findings, the Board reviewed in considerable detail the extensive record in this proceeding. On balance, it sees no evidentiary basis to sustain the concern of the Secretary of the Interior that substantial environmental harm will occur as a result of the construction and operation of Bailly N-1. Therefore, we cannot agree with his conclusions on this point. Additionally, we disagree with his opinion that an affirmative decision as regards the Application will infringe on the managerial responsibilities of the Department. The Secretary admitted that the Department does not have a specific policy with respect to low population zones (Tr. 7544-45). Therefore, his apprehension with regard to this problem is prospective in nature and speculative at best, especially, considering our findings on the improbability of environmental harm. Furthermore, it should be noted that proposed Bailly N-1, with its attendant cooling tower, is located entirely on property owned by NIPSCO. Neither the Applicant nor the Secretary has provided us with a legal basis for ruling that the Secretary has jurisdiction over property rights situated outside the confines of the Indiana Dunes National Lakeshore. As we previously determined, while the cooling tower does create a significant adverse impact, it was found that such visual pollution did not tilt the balance against the proposed action.

207. While we are hesitant to overrule objections of a sister agency, we cannot permit such objections to undermine the execution of responsibilities delegated to this Agency by the Congress. Under the facts of this case, the acquiescing to the request of the Department of Interior would amount to an abdication of our duties under the Atomic Energy Act, as amended, and NEPA.

VIII. Conditions on the Construction Permit

Based upon our previous findings herein, the Board concludes that the following conditions should be incorporated in the construction permit to be issued by the Director of Regulation:

A. Prior to start of construction, the Applicant in accordance with its commitment, will undertake the "Ecological Monitoring Program" and the "Monitoring Program for Water Levels of Interdunal Ponds During Construction Dewatering."

B. Prior to discharging to the site's ash settling ponds any liquid effluents attributable to site preparation, construction or operation of the Bailly Generating Station, Nuclear 1, if the required monitoring program indicates any evidence that ash pond seepage is causing a change in the chemical composition of the interdunal ponds, the Applicant will take remedial action as needed to assure that the Nuclear 1 effluents do not contribute significantly to any such changes.

C. The Applicant will determine the actual intake water velocities which exist around the outside of the intake structure with the present Units 7 and 8 operating. If intake velocities presently exceed 1 ft/sec, design changes will be made to reduce the intake velocities to less than 1 ft/sec prior to starting operation of the facility.

D. The Applicant will control and monitor total residual chlorine in such a way so as to assure that total residual chlorine levels in the discharge water does not exceed 0.1 ppm during the intermittent chlorination of cooling tower and service water circuits.

E. If harmful effects or evidence of irreversible damage are detected by the monitoring program, the

Applicant will provide to the Staff an analysis of the problem and a plan of action to be taken to eliminate or significantly reduce the detrimental effects or damage.

With the exception of 3.E(f) outlined in the Regulatory Staff's proposed construction permit, our conditions are identical with theirs (Appendix A, para. 3.E., Reg. Staff's Proposed Findings). The Applicant's proposed conditions appear to be identical to those of the Regulatory Staff (Attachment A to Applicant's Proposed Findings, para. 3.E.).

Section 3.E.(f) appears to represent a limited response to the problem of dose limitations which is presently before the Commission in a rulemaking proceeding. Although the proposed condition is part of a broader issue under intense review by the Commission, neither the Regulatory Staff nor the Applicant has furnished the Board with any evidentiary basis for its adoption, or for that matter, with any reason as to why the Applicant should be required to meet a dose standard not established by the present Commission Regulations. In these circumstances, we decline to impose the requested condition. Instead, the Applicant will be required to comply with the "as low as practicable" provisions presently in effect in 10 CFR Parts 20 and 50. Cf *South Carolina Electric and Gas Company (Virgil C. Summer Nuclear Station, Unit 1)*, ALAB-114, RAI-73-4 (April 13, 1973).

While we do not wish to mandate it as a condition to the construction permit, we urge NIPSCO to honor the commitment made by Mr. Horace P. Lyle, vice president, during the evidentiary hearing to keep the populace living in the region of Bailly N-1 informed about the results of the Applicant's monitoring programs, including those which might indicate detriment to the facility environs, particularly the Indiana Dunes National Lakeshore, and to pub-

licize fully the remedial measures taken to protect that environment (see Tr. 5030-5041 for discussion on notification to the public).

IX. Conclusions

A. The Application and the proceeding thereon comply with the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations.

B. Upon consideration of the entire record in this proceeding and the findings set forth above, this Board concludes that there is sufficient evidence to support the findings proposed to be made by the Director of Regulation on Items 1-4 of the Commission's Notice of Hearing in this proceeding.

C. In accordance with Appendix D to Part 50 of the Commission's Regulations, the Board concludes as follows:

1. the requirements of Section 102(2)(C) and (D) of NEPA and Appendix D have been complied with in this proceeding.

2. upon independently considering the final balance among the factors contained in the record of this proceeding, a construction permit should be granted for the construction of Bailly Generating Station—Nuclear 1, subject to the conditions specified earlier in this Initial Decision.

D. The granting of the construction permit will be in conformity with the Federal Water Pollution Control Act Amendments of 1972.

E. The granting of the construction permit will not run afoul of any known Federal law.

X. Order

Based on the Board's findings and conclusions, and pursuant to the Atomic Energy Act, as amended, and the Commission's Regulations, It Is Ordered that the Director of Regulation is authorized to issue a construction permit to the Applicant to construct Bailly Generating Station—Nuclear 1, consistent with the terms of this Initial Decision. It Is Further Ordered, in accordance with Sections 2.760, 2.762, 2.764, 2.785 and 2.786 of the Commission's Rules of Practice, that this Initial Decision shall become effective immediately and shall constitute, with respect to the matters covered therein, the final action of the Commission, subject to any review pursuant to the Commission's Rules of Practice. Exceptions to this Initial Decision may be filed by any party within seven (7) days after service of this Initial Decision. Within fifteen (15) days thereafter (twenty (20) days in the case of the Regulatory Staff) any party filing such exceptions shall file a brief in support thereof. Within fifteen (15) days of the filing of the brief of the appellant (twenty (20) days in the case of the Regulatory Staff), any other party may file a brief in support of, or in opposition to, the exceptions.

It Is So Ordered.

THE ATOMIC SAFETY AND LICENSING BOARD

/s/ Harry Foreman
Harry Foreman, *Member*

/s/ Walter H. Jordan
Walter H. Jordan, *Member*

/s/ Jerome Garfinkel
Jerome Garfinkel, *Chairman*

Issued at Bethesda, Maryland, this 5th day of April, 1974.

APPENDIX I

UNITED STATES ATOMIC ENERGY COMMISSION
Washington, D.C. 20545

March 20, 1974

Jerome Garfinkel, Esq.,
Chairman
Atomic Safety and
Licensing Board
U.S. Atomic Energy
Commission
Washington, D.C. 20545

Dr. Harry Foreman,
Director
Box 395 Mayo
University of Minnesota
Minneapolis, Minnesota
55455

Dr. Walter H. Jordan
881 West Outer Drive
Oak Ridge, Tennessee 37830

IN THE MATTER OF
NORTHERN INDIANA PUBLIC SERVICE COMPANY
(BAILLY GENERATING STATION, NUCLEAR 1)
DOCKET NO. 50-367

Gentlemen:

During the oral argument in this proceeding on February 19, 1974, staff counsel advised the Board that based on the Appeal Board's decisions in the Maine Yankee proceeding, ALAB-161 and ALAB-166, he believed the statement contained in the certificate issued to the applicant by the Stream Pollution Control Board of Indiana pursuant to Section 401 of the 1972 Water Pollution Control Act that "The preliminary plans were considered satisfactory with the following conditions:" implied there were conditions which should be included, pursuant to Section 401(d), as conditions of the Commission construction permit. Although staff counsel recognized this proceeding might be distinguished from the Maine Yankee case as pointed out by the applicant, he felt that the language of the Section

401 certificate issued by the Indiana Board was sufficiently similar to the language considered as constituting a condition in the Maine Yankee certificate to warrant suggesting to this Board that it include the Section 401 certificate's implied conditions as conditions to the Bailly construction permit.

The Board inquired whether there was any legal interpretation in any statute or regulation issued by a state government body as to a definition of the language "final plans" which appeared in one of the conditions. Staff counsel offered to make a search of Indiana statutes and regulations and inform the Board.

Subsequently, staff counsel received a communication from the Indiana Stream Pollution Control Board (copy attached) which states that it did not intend that any of the conditions referred in its letter of certification should be included as conditions of the Commission's construction permit, nor does it believe that any such conditions should be included. Based on this clear expression of the Indiana Stream Pollution Control Board's intention, the staff withdraws its suggestion that the conditions in the 401 certificate (App. Exh. 10 and 10A) be included as conditions of the Commission's construction permit. Accordingly, the staff believes that the Board's inquiry concerning interpretation of the language "final plans" may now be moot.

Sincerely,

/s/ Stuart A. Treby
STUART A. TREBY
Counsel for AEC Regulatory Staff

STATE OF INDIANA
INDIANAPOLIS 46206
1330 West Michigan Street
633-5467

March 11, 1974

STREAM POLLUTION CONTROL BOARD

Mr. Stuart Treby
Counsel for the Atomic Energy Commission Regulatory Staff
United States Atomic Energy Commission
Washington, D.C. 20545

USAES
OGC-BETHESDA

Dear Mr. Treby:

RE: IN THE MATTER OF NORTHERN INDIANA PUBLIC SERVICE COMPANY (BAILLY GENERATING STATION, NUCLEAR 1) DOCKET NO. 50-367

In a letter to Northern Indiana Public Service Company of February 20, 1973, (as corrected by our letter of March 8, 1973), the Stream Pollution Control Board of Indiana provided its certification pursuant to Section 401 of the 1972 Water Pollution Control Act for the Company's proposed Bailly Nuclear 1 generating station.

Our letter also stated our approval of preliminary plans submitted by the Company and mentioned certain "conditions" relating to such approval. We understand that, in the course of the proceeding before the U.S. Atomic Energy Commission considering the issuance of a construction permit for Bailly Nuclear 1, the AEC Regulatory Staff indicated that it understood our letter as implying that such "conditions" should be included as conditions of the AEC construction permit pursuant to Section 401 (d) of the 1972 Water Pollution Control Act.

This is to inform you that the Stream Pollution Control Board did not intend that any of the "conditions" referred to in its letter of certification should be included, pursuant to Section 401 (d), as conditions of the Atomic Energy Commission's construction permit, nor do we believe that any such conditions should be included.

Very truly yours,

/s/ Oral H. Hert
ORAL H. HERT
Technical Secretary

APPENDIX II

Year	System Capacity Without N-1 Megawatts	Demand 7.5%/yr, Megawatts	Reserve %	Demand 7%/yr, Megawatts	Reserve %	Demand 5%/yr, Megawatts	Reserve %
1973	2221	1800	23	1800	23	1800	23
1974	2572	1935	32	1926	33	1890	36
1975	2872	2080	38	2060	39	1984	45
1976	2872	2236	28	2205	30	2084	38
1977	3047	2404	26	2359	29	2188	39
1978	2872	2584	11	2524	14	2297	25
1979	2982	2778	7	2701	10	2412	23
1980	2782	2986	—	2890	—	2533	10
1981	2782	3210	—	3092	—	2659	4.6

UNITED STATES OF AMERICA ATOMIC ENERGY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

NORTHERN INDIANA PUBLIC SERVICE COMPANY
(Bailly Generating Station, Nuclear-1)

Docket No. 50-367

ORDER CORRECTING INITIAL DECISION DATED APRIL 5, 1974

The instant Atomic Safety and Licensing Board's Finding 163 (on page 135 of the Initial Decision) should be corrected to eliminate "*Washington Public Power Supply System* (Hanford 2 Nuclear Power Plant, ALAB-113, RAI-73-10 331 at pp. 842-43)." The following citation should be inserted in its place: *Long Island Lighting Company (Shoreham Nuclear Power Station)*, ALAB-156, RAI-73-10 831 at pp. 842-43.

In addition to the foregoing, the Board directs that the following changes should also be made:

(a) In Finding 174 (page 139), *Reed* should be changed to *Read.*

(b) In Finding 177 (pages 141-142), *Reed* should be changed to *Read.*

(c) Finding 178 (pages 142-143), *Reel* should be changed to *Read.*

(d) Finding 193 (page 155), *Reed* should be changed to *Read.*

(e) Wherever in Chapter VII. D. of this Initial Decision appears the title *Secretary of the Interior* it should be changed to *Assistant Secretary of the Interior.*

IT IS SO ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

/s/ Jerome Garfinkel
JEROME GARFINKEL, *Chairman*

Issued at Bethesda, Maryland, this 9th day of April, 1974.

UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

ALAB-224

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Alan S. Rosenthal, Chairman
Dr. John H. Buck, Member
Richard S. Salzman, Member

In the Matter of **Docket No. 50-367**

NORTHERN INDIANA PUBLIC SERVICE COMPANY

(Bailly Generating Station, Nuclear-1)

Messrs. William H. Eichhorn, Hammond, Indiana, and **Maurice Axelrad**, Washington, D.C., for the applicant, Northern Indiana Public Service Company.

Messrs. Edward W. Osann, Jr. and **Robert J. Vollen** (on the motion for a stay), Chicago, Illinois, for the Joint Intervenors, Porter County Chapter of the Izaak Walton League of America, *et al.*

Messrs. Stuart A. Treby and **David E. Kartalia** for the Atomic Energy Commission Regulatory Staff.

DECISION

August 29, 1974

This is an appeal by the Joint Intervenors[1] from a Licensing Board initial decision[2] authorizing the issuance of a permit for the construction of a 685 megawatt boiling water nuclear reactor by the Northern Indiana Public Service Company. The facility would be built on the applicant's property, known as the

[1] The Porter County Chapter of the Izaak Walton League of America, Inc.; Concerned Citizens Against the Bailly Nuclear Site; Businessmen for the Public Interest, Inc.; James E. Newman, Mildred Warner, and George Hanks. Mr. Edward Osann, Jr., withdrew as one of the Joint Intervenors on July 16, 1974 but continues as their counsel.

[2] Reported at RAI-74-4, 557 (April 5, 1974).

Bailly site, abutting Lake Michigan in Westchester Township, Porter County, Indiana. Applicant is currently operating two coal-fired electrical generating stations and a gas turbine peaking plant on that 350-acre site.

The Bailly property borders Lake Michigan to the north. The Burns Harbor Plant of the Bethlehem Steel Corporation adjoins the property on the west and south. To the east of the Bailly tract is the Indiana Dunes National Lakeshore, federally owned recreation land under the jurisdiction of the Department of the Interior. The proposed nuclear facility would be built on the west side of the Bailly tract, away from the National Lakeshore, between the existing fossil fuel plants and the steel plant.[3]

Joint Intervenors first challenge the Licensing Board's decision on a number of procedural grounds. Their briefs contend that the Licensing Board was biased, denied them a fair hearing, assumed a promotional rather than a regulatory role in the hearing, and took evidence in the absence of one of its members. In addition, they contend that the staff failed to furnish them with a key AEC document in response to their discovery requests.

With respect to the substance of the Board's decision, intervenors say that a nuclear facility at the Bailly site will have an adverse environmental effect on the National Lakeshore. Asserting that other satisfactory locations are available for the facility and that the applicant has no need for the power to be generated by it, intervenors claim that the Board's approval of a nuclear plant at the Bailly site violated either the act authorizing the National Lakeshore, 16 U.S.C. §460u (1970), or the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§4321 *et seq.* (1970), or both.

Our independent appraisal of the record reveals intervenors' contentions, procedural and substantive, to lack merit. We find instead that the Licensing Board conducted the proceedings with fairness, objectivity and due accommodation for intervenors' rights. We also approve the Board's carefully documented findings that the possibility of environmental harm to the National Lakeshore from the nuclear facility is remote, concur in its determination that appropriate alternate sites for the facility were considered, and agree with its conclusions that neither the Lakeshore Act nor NEPA bars a nuclear facility at the Bailly site. We therefore affirm the decision below and allow our previously ordered partial stay of construction of the Bailly facility to expire.[4]

We discuss in Part I intervenors' procedural contentions, turn in Part II to their substantive objections to the initial decision, and treat in Part III their motion to continue the limited stay of construction in effect pending judicial review of this decision.

[3] Bethlehem Steel Corporation intervened as a party in support of the application but took almost no active part in the proceeding. (Tr. 24, 688-92.)

[4] See ALAB-200, RAI-74-4, 483 (April 30, 1974), and ALAB-201, RAI-74-5, 821 (May 3, 1974).

I. PROCEDURAL CONTENTIONS

1. **Bias.** The opening argument of intervenors' brief makes the claim that "the record establishes such bias against [them] and lack of objectivity on the part of the [Licensing] Board that the decision must be reversed." We have no quarrel with intervenors' assertion that they were entitled to a hearing before an impartial tribunal; of course they were.[5] What is not convincing is intervenors' attempt to demonstrate that they did not receive one.

The specifications intervenors marshal to support their indictment of the Board as prejudiced against them are limited to a recital of unfavorable Board rulings.[6] Although these rulings are asserted to have been made "incorrectly" or "arbitrarily," intervenors' brief contains no exposition why they were wrong or irrational. It is intervenors' thesis that this rain of unfavorable rulings, by itself, demonstrates "a climate of bias and unfairness" which necessarily resulted in a denial of due process to them. We do not agree.

To establish that a hearing was biased, something more must be shown than that the presiding officials decided matters incorrectly; to be wrong is not necessarily to be partisan. *Tennessee Valley Authority* (Bellefonte Nuclear Plant, Units 1 and 2), ALAB-164, RAI-73-12, 1143 (December 11, 1973). We think it is as true in administrative hearings as it is in court cases that "[r]ulings and findings made by a judge in the course of a judicial proceeding are not in themselves sufficient reasons to believe that the judge has a personal bias or prejudice for or against a party." *United States* v. *Amick*, 439 F.2d 351, 369 (7th Cir.), certiorari denied, 404 U.S. 823 (1971). Accord, *Ex parte American Steel Barrel Co.*, 230 U.S. 35, 44 (1913); *Morgan* v. *United States*, 380 F.2d 686, 699 (9th Cir. 1967), certiorari denied, 390 U.S. 962 (1968); *Knapp* v. *Kinsey*, 232 F.2d 458, 466 (6th Cir.), certiorari denied, 352 U.S. 892 (1956). Because intervenors advance no justification for a finding of bias other than the series of Board rulings mentioned, their claim must fail.

But we do not reject intervenors' bias claim on that ground alone. We note that the zeal with which they press the bias contention before us contrasts markedly with their reticence before the Licensing Board.[7] Such silence is fatal to a contention of this nature.

[5] See *Morgan* v. *United States*, 304 U.S. 1 (1938); and *Hannah* v. *Larche*, 363 U.S. 420 (1960).

[6] The rulings in question encompassed such matters as scheduling hearings and prehearing conferences, discovery requests, admitting contentions, etc.

[7] Intervenors did challenge the qualifications of one of the Board's technical members, but not for any action on his part in this case. The disqualification claim rested on the fact that on previous occasions the member had served as an environmental consultant in nuclear matters to a power company other than the applicant. (The Board member in question is a university professor who serves from time to time on the Commission's licensing boards.) The Licensing Board held that the challenged member was not disqualified for this reason. That holding was affirmed by us on a prior, interlocutory appeal. ALAB-76, WASH-1218 (Suppl.-1), 510 (October 30, 1972). Intervenors advance no reason for reconsideration of that ruling.

BEST COPY AVAILABLE

We have previously considered when challenges based on bias in licensing board proceedings must be made. *Consumers Power Company* (Midland Plant, Units 1 and 2), ALAB-101, RAI-73-2, 60 (February 20, 1973). In that decision we held that (*id.* at 63):

> For motions for the disqualification of an adjudicator to be entertained, they must be filed in a timely manner. The Administrative Procedure Act, which applies to Commission licensing proceedings, explicitly so provides. 5 U.S.C. 556(b). *The failure of a party to file a motion for disqualification once the information giving rise to such a claim is available to him amounts to a waiver of the disqualification objection.* [Emphasis added.]

The result in *Midland* did not rest on the mandates of the Administrative Procedure Act alone. The decision also recognized and applied the requirement of basic equity that a party may not "remain silent, await the decision of the [tribunal], and then, doubtless because of its disappointment, seek for the first time to asperse the objectivity of a quasi-judicial officer who joined in the challenged opinion." *Ibid.* This is a settled precept, applicable to administrative proceedings generally. *Taylor* v. *New York City Transit Authority*, 433 F.2d 665, 670 (2nd Cir. 1970); *Safeway Stores, Incorporated* v. *F.T.C.*, 366 F.2d 795, 802 (9th Cir. 1966), certiorari denied, 386 U. S. 932 (1967); *Gilligan, Will & Co.* v. *Securities and Exchange Commission*, 267 F.2d 461, 468 (2nd Cir.), certiorari denied, 361 U.S. 896 (1959); *Marquette Cement Mfg. Co.* v. *Federal Trade Commission*, 147 F.2d 589, 591-592 (7th Cir. 1945), affirmed, 333 U.S. 683 (1948). Nor is it unique to administrative practice. It is equally true in court that an allegation that a judge is not acting evenhandedly must be made as soon as a party becomes aware of grounds for it. It is too late to wait until appeal before raising such contentions; indeed, even shorter delays have been held fatal. *Securities and Exchange Commission* v. *Bartlett*, 422 F.2d 475, 480 (8th Cir. 1970); *Davis* v. *Cities Service Oil Company*, 420 F.2d 1278, 1282 (10th Cir. 1970); *In re Union Leader Corporation*, 292 F.2d 381, 390 (1st Cir.), certiorari denied, 368 U.S. 927 (1961); *In re United Shoe Machinery Corporation*, 276 F.2d 77, 79 (1st Cir. 1960); *Adams Dairy Company* v. *St. Louis Dairy Company*, 260 F.2d 46, 55-56 (8th Cir. 1958).

The application of that rule to this case calls for our rejection of intervenors' claim that the Licensing Board was prejudiced against them. Their brief acknowledges (p. 2), indeed insists, that the supposedly partisan attitude of the trial board manifested itself "commencing with prehearing procedures and throughout the evidentiary hearing". Yet intervenors did not mention the matter below. To be sure, the bias is asserted to have resulted from the cumulative effect of a series of procedural rulings made over the course of the evidentiary hearing rather than from one specific action. But we cannot accept the notion that this fact entitled intervenors to postpone raising their claim of bias until the appeal stage. There is no basis for an assumption that the prejudicial effect of those cumulative rulings could not be appreciated until viewed in the light of the

trial board's adverse decision. If, as intervenors tell us, a "climate of bias" pervaded the trial proceedings, we do not perceive how they can see it so clearly on appeal without having noticed its existence while in the midst of the storm below. *Davis* v. *Cities Service Oil Company, supra*;[8] *Adams Dairy Company* v. *St. Louis Dairy Company, supra.*

We therefore reject intervenors' claim that the Licensing Board was biased against them as untimely[9] in addition to being unsupported.

2. **Opportunity for a fair hearing.** Intervenors' bias claim rested on a series of purported procedural errors by the Licensing Board. As we noted, intervenors merely assert that those rulings were wrong without providing us with any basis on which to agree or disagree; on this point their brief does little more than restate their exceptions. Where we have not been presented with briefs containing sufficient information or discussion to allow an intelligent disposition of issues, we may treat those issues as having been waived. See *Long Island Lighting Company* (Shoreham Nuclear Power Station), ALAB-156, RAI-73-10, 831 (October 26, 1973).[10] Nevertheless, we have reviewed the record to ensure that intervenors were given a fair chance to prepare and present their case before the Licensing Board. *Cf. Southern California Edison Company* (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-212, RAI-74-6, 986, 994 (June 18, 1974).

(a) As we discern it, the thread linking intervenors' objections to the Board's procedural rulings is their claim that they were given insufficient time for

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[8] In *Davis*, plaintiffs had not challenged the tribunal as biased until after its decision had been rendered. They sought to excuse their delay—as intervenors do here—on the ground that the prejudice arose from a series of rulings and comments which allegedly had a cumulative prejudicial effect not immediately appreciated by them. The court of appeals rejected that excuse, observing that (420 F.2d at 1282): "[p]romptness in asserting disqualification is required to prevent a party from awaiting the outcome before taking action. [Citation omitted.] These plaintiffs withheld action until a month after the case was decided against them. Such an application comes too late."

[9] The decisions cited by intervenors support the result we reach. In *National Labor Relations Board* v. *Phelps*, 136 F.2d 562 (5th Cir. 1943), adhered to in *National Labor Relations Bd.* v. *National Paper Co.*, 216 F.2d 859 (5th Cir. 1954), Circuit Judge Hutcheson carefully noted that the motion to disqualify for bias was presented initially to the trial examiner, not withheld until appellate review by the Labor Board or the court of appeals. See 136 F.2d at 565-66 and fn. 6.

[10] This accords with standard appellate practice. *E.g., United States* v. *White*, 454 F.2d 435, 439 (7th Cir. 1971), certiorari denied, 406 U.S. 962 (1972); *United States* v. *Williams*, 378 F.2d 665, 666 (4th Cir. 1967); *North Texas Producers Ass'n* v. *Metzger Dairies, Inc.*, 348 F.2d 189, 196 (5th Cir. 1965), certiorari denied, 382 U.S. 977 (1966); *Burns* v. *Travelers Insurance Company*, 344 F.2d 70, 75 (5th Cir. 1965); *Cashner* v. *United States Steel Corporation*, 327 F.2d 533, 537 (6th Cir. 1964); *Cratty* v. *United States*, 163 F.2d 844, 851 (D. C. Cir. 1947).

discovery, trial preparation and submission of proposed findings of fact and conclusions of law.

The record reveals that notice of the application to construct the Bailly facility was published in the *Federal Register* on December 29, 1971 and set January 28, 1972 as the deadline for filing petitions to intervene in the proceeding. 36 *F. R.* 25175. Joint Intervenors made timely application and, with one exception,[11] were admitted as parties in the Board's order of May 15, 1972.

Although the Board ordered commencement of discovery at the first prehearing conference, it did not hold the first session for the taking of evidence until October 10, 1972. That session was restricted to radiological health and safety issues and consumed only four days. Evidence on environmental issues was not received until six months later in a series of trial sessions consuming 59 hearing days in total. Those sessions commenced on April 30, 1973 and continued over the spring, summer and fall of that year. The Board afforded intervals of one to three weeks between sessions, generally following presentation of each party's witnesses, to provide counsel with time to prepare for the next session as well as to attend to other business. After completion of the applicant's and the staff's affirmative cases, the Licensing Board recessed for some five and one-half weeks (August 9 to September 18, 1973) to allow intervenors to prepare their affirmative case. The last evidentiary session ended on November 14, 1973. Intervenors were then permitted more than 10 weeks (including two one-week extensions of time) to draft proposed findings of fact and conclusions of law. Intervenors filed some 150 pages of proposed findings and conclusions on January 25, 1974. The Board's initial decision followed on April 5, 1974.

The foregoing recital confirms for us that the Board proceeded with appropriate speed. While the record is long (11,000 transcript pages and several hundred exhibits), it appears to have been developed in an orderly manner with due consideration for all parties' needs for time to marshal their evidence and to prepare for trial. The allowance of ten weeks at the end of the hearings in which to draft proposed findings of fact and conclusions of law was not exiguous.

(b) There is one matter which merits further discussion—namely, the effect of a delay in the production of documents by the Commission in response to intervenors' demands. For the reasons we discuss *infra*, p. 252, those documents were not furnished to intervenors before the initial evidentiary session of October 10, 1972, at which the applicant presented its affirmative case on radiation health and safety issues.

Intervenors objected to going to trial until they had received the documents in question, although by then they had completed discovery against the

[11] The exception, BPI, was required to supplement its showing of interest and was not admitted until June 26, 1972.

applicant, had obtained access to the applicant's five volume Preliminary Safety Analysis Report (PSAR) and had in hand the Regulatory Staff's Safety Evaluation Report on the proposed Bailly facility. The Licensing Board, rather than postpone the hearing at this juncture, elected to hold the evidentiary session. Although in so doing the Board acted contrary to intervenors' desires, it took steps to protect their interests. It informed intervenors that, if they participated in the scheduled hearing, they would be given an opportunity to recall and cross-examine applicant's and the staff's witnesses, to present new evidence and to add new contentions after they had received and reviewed the documents sought from the Commission. In short, the Licensing Board was willing to afford intervenors "two bites at the apple" (Tr. 492). The Board went on to explain, however, that if intervenors declined to participate, they would lose the opportunity to cross-examine those witnesses later on the matters then in issue. (Tr. 494-95.) The intervenors chose literally to walk out of the hearing. (Tr. 510.)

The Board held the session notwithstanding intervenors' absence. It further ruled that, because of intervenors' failure to participate, they would not be allowed to recall those witnesses at some later time for cross-examination on matters considered at the evidentiary session they had abandoned.

The course which the Board followed was expressly sanctioned by the Rules of Practice, and, in our view, represented a judicious handling of the situation. For obvious reasons of necessity, the scheduling and conduct of evidentiary sessions is committed to the Licensing Board's discretion. 10 C.F.R. §2.718 (1974 rev.). In this instance, the Board was faced with a party's objection to proceeding with a scheduled hearing because its discovery demands had not been completely satisfied. The Board's resolution of the situation—declining to postpone the hearing and to send the witnesses packing but preserving intervenors' right to recall them for future examination and to present additional evidence of their own after they received the Commission documents—had several advantages. Among other things, it minimized the inconvenience to the witnesses (who were not responsible for the failure to produce the documents) without jeopardizing intervenors' opportunity for cross-examination and introduction of new evidence based on those documents. And it cannot be said that intervenors' participation in the hearing at that stage would have been an empty gesture. As noted, they already possessed considerable amounts of material previously furnished them. At the very least they had in hand all documents to be presented by the applicant and the staff in their affirmative cases (Tr. 491-93.). These were sufficient to provide a basis for intelligent cross-examination of the witnesses to be presented at that time. We therefore hold that the course adopted by the Board was a reasonable exercise of its discretion in the circumstances which neither deprived intervenors of substantial rights nor prejudiced the presentation of their cause.

Nor did the Board act arbitrarily in circumscribing intervenors' rights to future cross-examination of these witnesses whom intervenors had, by their actions, deliberately elected to ignore. The Commission's Rules of Practice provide in pertinent part (10 C.F.R. §2.707):

> On failure of a party . . . to appear at a hearing . . . the presiding officer may make such orders in regard to the failure as are just, including, among others, the following:
>
> (a) Without further notice, find the facts as to the matters regarding which the order was made in accordance with the claim of the party obtaining the order, and enter such order as may be appropriate; or
>
> (b) Proceed without further notice to take proof on the issues specified.

Intervenors' conduct merited the sanction imposed by the Board. American jurisprudence has long passed the point where a party—particularly one represented by experienced counsel—may refuse to participate in a case because the presiding official ruled in a manner it did not like. There are appropriate ways of preserving objections to such rulings; going home is not one of them. A party may not be heard to complain that its rights were unjustly abridged after "[h]aving thus purposefully refused to participate." *Brotherhood of Railroad Trainmen* v. *Chicago, M., St. P. & P. R. R.*, 380 F.2d 605, 608-09 (D.C. Cir., per Burger, J.), certiorari denied, 389 U.S. 928 (1967). See also, *United States* v. *Taylor*, 333 F.2d 633, 639-40 (5th Cir. 1964); *Federal Power Commission* v. *Arizona Edison Co.*, 194 F.2d 679, 683-86 (9th Cir. 1952).

It is worthy of note that the Board made good on its commitment to allow intervenors to supplement their contentions at a later date. More than 11,000 pages of documentary material were ultimately furnished intervenors by the Commission, most being turned over to them between October 31 and December 27, 1972. Aside from a relatively small number of documents which the staff withheld under various claims of privilege (claims later upheld by a district court[12]), this constituted the overwhelming bulk of the documents intervenors had demanded be produced. (About 600 additional pages of updated material were later turned over to them on April 18, 1973.) The Licensing Board permitted intervenors to submit additional contentions based on those new documents for consideration at future hearings, some 25 (out of 31) of which were accepted and put at issue. They were also allowed to continue discovery based on those contentions until the next evidentiary session commenced on April 30, 1973. At the hearing session which followed, evidence derived from or based on information in the Commission documents was offered by intervenors and admitted. As noted previously, the sessions continued at well-spaced

[12] See *Porter County Chapter of the Izaak Walton League, etc., et al.* v. *A.E.C.*, Civil No. 72 H 251 (N.D. Ind. August 13, 1974) (unreported at this writing).

intervals until November 14, 1973. The pace of the hearings was not unduly forced and the schedule allowed intervenors adequate time to use the information they had gathered through discovery in attempting to make their case.[13]

We have also examined the record in connection with the other allegations of procedural error on the part of the Board mentioned without exposition in intervenors' brief. We find no error. Accordingly, we reject the contention that intervenors were denied the opportunity for a full and fair hearing by the Licensing Board.

3. **AEC failure to furnish a staff working paper to intervenors.** Joint Intervenors next contend that the cause must be remanded because the regulatory staff's response to their discovery requests was incomplete and prejudicial by virtue of its failure to include the draft of an internal staff working paper pertaining to allowable levels of population density around

[13] Our disposition of this issue renders unnecessary our examination of the cause for the eight-month lapse between intervenors' initial demand for, and the Commission's production of certain AEC documents. A brief discussion, however, is in order. What occurred was that intervenors insisted that the production be made under the Freedom of Information Act (FOIA) (Tr. 19, 21, 113-14) and not under the Commission's Rules of Practice as the Board and staff counsel suggested (Tr. 50-51, 65, 85, 119). Intervenors assumed that a wider scope of relevant AEC materials could be reached under the FOIA than under the Rules. (Tr. 110-12, see also App. Tr. 66-67.) That assumption was incorrect. See *Consumers Power Company* (Midland Plant, Units No. 1 and 2), ALAB-33, 4 AEC 701 (1971). However, unlike discovery under the Rules, responses to requests for documents made under the FOIA are outside the Licensing Board's and staff counsel's control. See 10 C.F.R. Part 9. We appreciate their reluctance to treat intervenors' FOIA demand as one under the Rules of Practice in the face of counsel's objections. They were entitled to assume he had some reason for preferring the FOIA approach because differences do exist between the two types of demands; *e.g.*, a showing of relevance or need is necessary under the discovery rules but not under the FOIA. When it finally became clear some months later that intervenors simply had not appreciated that the documents sought could be supplied under the Rules of Practice (see Tr. 113-15, staff ltr. Thorkelson to Osann of 9/26/72 and reply 10/2/72), staff counsel acted with reasonable dispatch to furnish the 11,500 pages of material encompassed by intervenors' demands.

In short, no one was at "fault." Such misunderstandings do arise in the course of litigation. Staff counsel is to be commended for taking the initiative to end the impasse. We understand that it is now general practice to treat FOIA demands in contested cases as if made under the Rules, absent express objection. We wholeheartedly concur in that approach, which has also been adopted by at least one court. See *National Cable Television Association, Inc.* v. *F.C.C.*, 479 F.2d 183, 193 (D. C. Cir. 1973); and *cf. Renegotiation Board* v. *Bannercraft Company*, 415 U.S. 1, 39 L.Ed 2nd 123, 140 (1974). (The reason for the delay in responding to the FOIA request is not fully indicated in the record before us; we therefore can express no comment on that matter.)

nuclear plant sites.[14] The document in question is dated April 17, 1973. The Commission did not release it for public distribution, however, until April 9, 1974, after the Licensing Board had rendered its decision.[15]

The "siting guidelines" discussed in the staff working paper have not been adopted by the Commission. Rather, as stated in its press release accompanying publication of the draft paper, the Commission "is continuing work to develop generally applicable environmental siting guides for nuclear power plants."[16]

Intervenors stress that the Bailly site's suitability for a nuclear facility was at issue in the proceeding. They contend that, although Bailly might meet the siting criteria urged by the staff at the hearing, that site does not satisfy the conditions outlined in the draft working paper (which they call the "siting document"). Intervenors therefore argue that the failure to furnish them with that "crucial" document was prejudicial. In their view, non-disclosure of the "conflicting staff position" misled the Licensing Board into finding the Bailly site an acceptable one. Had the "siting document" criteria been applied, intervenors say, the Board would have had to reject the Bailly site in favor of an alternative location.

Both the staff and the applicant respond that the draft working paper in question was not furnished simply because it was not encompassed within the scope of the intervenors' discovery requests. In short, they say that intervenors may not complain about not getting what they did not ask for. We agree.

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[14] The working paper was in three parts: an eight-page discussion of problems posed by nuclear facilities proximate to metropolitan areas, "a policy statement" and a "regulatory guide" the drafters proposed for consideration and adoption by the Commission, and an appendix containing background information. The complete text appears in the record appended to intervenors' May 21, 1974 motion for summary reversal. See fn. 15, *infra*.

[15] This contention was initially put forward by intervenors in a motion for summary reversal dated May 21, 1974. We ordered that motion treated as a late-filed exception (No. 501) and directed applicant and the staff to respond to it in the course of briefing the appeal, which they have done.

[16] AEC press release No. T-160, April 9, 1974, attached to intervenors' motion for summary reversal, see fn. *15, supra*. The release also disclosed that "[a]s part of the development of this internal staff working paper in 1973, discussions were held with a number of persons and groups, both inside and outside the nuclear industry, to obtain their views on [the] subject." The record is not clear whether the paper was shown to persons outside the Commission prior to its general public release or whether its subject matter was a topic of discussion without that disclosure. (At oral argument staff counsel represented to us that the draft working paper was in fact not shown to anyone outside the Commission prior to general publication. App. Tr. p. 176.) As the regulatory staff has not claimed that the draft working paper was privileged from disclosure (see *Environmental Protection Agency* v. *Mink*, 410 U.S. 73 (1973)), we need not decide whether that privilege was waived by discussion of the document (or its contents) with persons outside the Commission. See *Wellford* v. *Hardin*, 444 F.2d 21, 24 (4th Cir. 1971); *Ditlow* v. *Volpe*, 362 F. Supp. 1321, 1325 (D.D.C. 1973); and *Legal Aid Society of Alameda County* v. *Schultz*, 349 F. Supp. 771,777 (N.D.Cal. 1972).

Intervenors' demands for documents were specifically framed in terms of material with an immediate and direct bearing on "the proposed Bailly nuclear plant." Indeed, their counsel expressly advised the Board that intervenors were not seeking documentary material bearing on nuclear facilities in general. Rather, he represented that (Tr. 113):

> We asked for documents which pertain to the Bailly Nuclear Plant. We didn't ask for things that were far afield from that. We wanted to see all of the documents dealing with the Bailly Nuclear Plant, which the regulatory staff used in making its safety evaluation and in making its environmental statement.[17]

Staff counsel supplied documents in accordance with that understanding and stated for the record on more than one occasion that this was what was being done. See, *e.g.*, Tr. 1297-1303. Intervenors did not demur.

The draft working paper in question does not fairly come within the categories described in intervenors' request for documents. It is a general proposal put forward for possible consideration in connection with future license applications; it neither focuses on nor discusses the Bailly site in particular.[18] Neither was it used in preparing either the Final Environmental Statement or the Safety Evaluation for the Bailly facility, to which intervenors' documentary demands were directed. (See this page, *supra*.) The working paper was drafted after those documents were completed.[19]

There was nothing unusual about intervenors' decision to limit their request to Bailly-related documents or anything untoward in the staff furnishing only such documents. Even when so restricted, intervenors' request for the production of Commission documents was very far-reaching. It brought forth over 11,000 pages of material from the regulatory staff,[20] hardly a meager response. In the circumstances, the staff cannot be faulted for failing to produce the draft working paper in question.

Moreover, that document is not the "crucial" paper intervenors would make it out to be. It is simply a tentative position proposed by some members of the regulatory staff. It neither represents nor purports to present Atomic Energy

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[17] Counsel characterized the focus of intervenors' demand for documents similarly at the first prehearing conference. See Tr. 65.

[18] The closest the draft comes to dealing with Bailly is to list that site in a table along with every other site proposed for nuclear plants then under consideration. See Table 2 of Appendix B.

[19] As noted above, the working paper was dated April 17, 1973. Both the Final Environmental Statement and the Final Safety Evaluation Report were completed in February of that year, two months earlier.

[20] See p. 251, *supra*.

Commission policy respecting nuclear power plant sites.[21] That policy is published in the Code of Federal Regulations. 10 C.F.R. Part 100 (1974 rev.). Unless and until modified or changed by the Commission—whether by adoption of the suggestions in the working paper or otherwise—Part 100 governs licensing board decisions on siting matters.

The Licensing Board in this case evaluated the Bailly site in light of those governing Commission standards.[22] The existence of a draft internal staff working paper suggesting the adoption of some other standards, whether known to the Board or not, could not relieve the Board of its obligation to apply the current regulations. This being so, intervenors were not prejudiced even were that paper within the scope of their request for documents. Their exception based on the failure to turn over the document in question is without merit.[23]

4. **Promotional role.** Intervenors contend that the Licensing Board, instead of acting as an impartial arbiter, "assumed a promotional role" in approving the Bailly application. The contention is based almost entirely on a single sentence lifted out of the Board's opinion, which reads (RAI-74-4 at 628):

> Therefore, we believe that the two Agencies must be accorded "equal partner" status with distinct, but complementary mandates; the Atomic Energy Commission to encourage the supply of adequate electrical energy *under proper safeguards,* and the Department of Interior to protect special environmental landmarks. [Emphasis in original.]

[21] As we recently observed with respect to this same staff working paper: "There would appear to be no dispute that the April 17, 1973 document has not yet been promulgated as AEC regulatory policy. There is no indication in the material before us whether it will be. . . . [T]he information before us suggests that the document is only an internal working draft and is not masquerading as a part of some covert attempt to change regulatory policy or to suppress expert opinion. As such, it has no legal significance for any AEC regulatory purpose." *Consolidated Edison Co. of New York, Inc.* (Indian Point Station, Unit No. 2), ALAB-209, RAI-74-6, 971 973. (June 13, 1974).

[22] See Initial Decision, paragraphs 18-27, RAI-74-4 at 562-66.

[23] Intervenors' reliance on *Committee for Nuclear Responsibility, Inc.* v. *Seaborg,* 463 F.2d 783, 787 (D. C. Cir. 1971), for the proposition that the draft working paper should have been disclosed because the staff was under a duty to come forward with competing scientific information within its own house, is not well-founded. The working draft contains no expert opinions which would discredit staff testimony given at the hearings. It merely proposes that the AEC substitute formal siting guidelines for the present case-by-case appraisal, where each proposed nuclear facility site is evaluated individually. As noted, the Commission is thus far unpersuaded that this new approach is a desirable one. In any event, the cited case does not apply to the situation before us, an adjudicatory hearing at which intervenors were free to (and did) introduce their own contrary evidence respecting the appropriateness of the Bailly site. *Union of Concerned Scientists* v. *A.E.C.*, ___ F.2d ___, 6 ERC 1705, 1713, fn. 34 (D.C. Cir. June 10, 1974); and *Wisconsin Electric Power Company* (Point Beach Nuclear Plant, Unit 2), ALAB-137, RAI-73-7, 491, 495-96 (July 17, 1973).

This sentence, intervenors assert, demonstrates that the Board believed itself obliged to increase the future supply of electricity by licensing nuclear power plants and acted primarily upon that belief in making its decision, to the exclusion of its regulatory responsibilities.

It bears repeating that "[t]he real import of an opinion, however, cannot be ascertained from a single word, phrase, sentence, or even paragraph, disassociated from the setting in which they are employed, and without considering the problem which was being considered . . . ."[24] In context, it is manifest that the sentence does not bear the meaning ascribed to it by intervenors.

Because of the Interior Department's interest in the Indiana Dunes National Lakeshore (which touches applicant's Bailly property; see p. 257 *et seq., infra*), an Assistant Secretary of the Interior appeared and testified as a witness before the Licensing Board. The quoted sentence is to be understood in relationship to the argument, advanced by the applicant and staff in this case, that the Interior Department's views merited no greater weight than those of any individual happening to be a neighbor of a proposed nuclear facility. The Board rejected that argument, giving its reasons for doing so. In pertinent part (with the passage relied on by intervenors inserted in its proper place) the Board said (*ibid.*):

> The Department [of the Interior] has been directed by Congress to protect on behalf of this nation an environment with special qualities—Indiana Dunes National Lakeshore—just as we have been entrusted with a public duty to license nuclear power plants under safe conditions. Under NEPA, we would be remiss in our responsibilities if we were to deprecate this important role of the Department by aliking it to that of an individual neighbor.
>
> Therefore, we believe that the two Agencies must be accorded "equal partner" status with distinct, but complementary mandates; the Atomic Energy Commission to encourage the supply of adequate electrical energy *under proper safeguards*, and the Department of Interior to protect special environmental landmarks. Consequently, as the Board indicated during the course of the hearing, careful consideration must be given to the policies of the Department regarding the uses of the Indiana Dunes National Lakeshore and how the proposed Bailly action affects them (Tr. 7543).

Those paragraphs demonstrate the Licensing Board's manifest commitment to, rather than its derogation of, its regulatory responsibilities. Indeed, their entire thrust—which stresses the need for careful consideration of precisely how the Bailly operation might impinge on the policies of the Department of the Interior in administering the Lakeshore—is wholly inconsistent with inter-

[24] *Flowers* v. *Fidelity & Casualty Co.*, 156 F.2d 586, 589 (10th Cir. 1946).

venors' assertion that the Board reached its decision on the basis of a desire to promote the supply of electricity no matter what. In short, a full appreciation of the context in which the sentence objected to was made renders bootless intervenors' claim that the Licensing Board acted improperly.[25]

5. **Lack of a quorum.** The final procedural contention raised by intervenors' brief is that the Licensing Board committed prejudicial error in hearing witnesses on occasion in the absence of one of its technical members. This same question also came before us in the context of another licensing proceeding. Deeming the matter one of sufficient importance to merit our prompt guidance to the licensing boards, we factored out that issue for treatment in our joint opinion in *Commonwealth Edison Company* and *Northern Indiana Public Service Company* (The Quorum Cases), ALAB-222, RAI-74-8, 229 (August 6, 1974). That decision holds, among other things, that the intervenors had waived any complaint respecting the taking of evidence by the Board with one technical member absent. We confine ourselves here, in the interest of brevity, to noting that our reasons for reaching that result are fully developed in that decision.

II. SUBSTANTIVE OBJECTIONS

1. **Background.** Joint Intervenors' dissatisfaction with the Licensing Board's decision centers on the proximity of the Bailly location to the Indiana Dunes National Lakeshore. The Lakeshore is an irregularly shaped area that stretches some eleven miles along the south shore of Lake Michigan. It encompasses beaches, sand dunes, marshes and bogs and is generally dedicated to public recreational purposes.[26] Some of its features, the dune ridges and Cowles Bog National Landmark in particular, are undoubtedly unique.

The Bailly tract touches the western edge of the National Lakeshore. The part of that property immediately adjacent to the parkland, to a depth of some 300 to 500 feet, lies in a "greenbelt zone" established by the local authorities. This portion is free of industrial construction.[27] The remainder of the 350-acre Bailly tract lies in an area zoned for and occupied by heavy industry,

[25] Intervenors also argue that the Board's findings on the "need for power" demonstrate its promotional approach. Those findings were made in the performance of its independent cost-benefit analysis under NEPA, (See 10 C.F.R. Part 50, App. D., §A.11 (1974 rev.)). They constitute a proper exercise of the Board's regulatory responsibilities and provide no support for intervenors' promotional claim.

[26] Interspersed within the outer bounds of the Lakeshore, but not part of it, are the towns of Dune Acres and Beverly Shores, and the Indiana Dunes State Park.

[27] See Applicant's exh. 32, Criner testimony following Tr. 4215, and map preceding Tr. 4216.

exemplified by the Bethlehem Steel Corporation plant which borders the Bailly site immediately to the west and south. Lake Michigan forms the northern border of the property.

Applicant, a public utility corporation, has owned the Bailly property since 1932, using it as a site for power plants. Already in place and operating on that property are two coal-fired electric generating facilities with 250-foot-high chimneys and a gas turbine "peaking" plant, together with related high voltage transmission lines, coal storage facilities, conveyor belts, and a series of ash ponds, the last used as settling basins for sluice water from the coal-fired plants.

The Bailly nuclear facility would be erected between the three existing power plants and the Bethlehem Steel plant. In other words, the proposed site for the nuclear plant is that portion of the Bailly tract furthest away from the National Lakeshore and separated from it by three power plants and a greenbelt zone of several hundred feet.

In addition to buildings housing the reactor and generating equipment, the nuclear facility would require a natural draft cooling tower. That hyperbolic structure would be approximately 450 feet tall, 440 feet wide at the base, and 350 feet wide at the top. It, too, would be located next to the Bethlehem property about as far removed as possible from the Lakeshore. Nevertheless, its size would make it visible to persons in the western end of the National Lakeshore.

Intervenors asserted before the Licensing Board that building and operating a nuclear power generating plant at the Bailly location would adversely affect the environment of the nearby federal parkland. They contended, therefore, that its construction is forbidden by the act of Congress authorizing the Lakeshore, 16 U.S.C. §460u (1970), and the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§4321 *et seq.* (1970). The Board rejected both intervenors' factual premises as contrary to the evidence and intervenors' legal conclusions as not well-founded. Intervenors have taken exception to those rulings.

2. **The impact of the Bailly facility on the Indiana Dunes National Lakeshore.** The Licensing Board noted that the proposed nuclear powered generating facility would be erected in an area zoned for heavy industry amidst sizeable existing industrial structures. The Board further found, in substance, that the likelihood of significant direct physical impact on the nearby Indiana Dunes National Lakeshore environment from either the construction or operation of the Bailly facility was "negligible,"[28] and even that remote possibility could be avoided or prevented. Accordingly, the Board sanctioned the issuance of the construction permit, but conditioned that approval on the applicant's taking steps to insure that even distant possibilities of environmental harm were minimized.[29] The Board did find, however, that the facility's cooling

[28] RAI-74-4, 612 (paragraph 160).

[29] RAI-74-4, 629-30.

tower would be a man-made "visual intrusion" on the western horizon of the Lakeshore.[30] But in light of other considerations it did not deem this adverse factor sufficient to tilt the balance against issuing the construction permit.[31]

Intervenors excepted to those findings, among others.[32] Their briefs, however, challenge only the Board's determination that lowering the ground water table at the construction site while the facility is being built will not injure ecological systems in the diverse bogs, ponds and marshes of the National Lakeshore.[33] Notwithstanding intervenors' failure to brief other points, the discharge of our responsibilities calls for us to determine independently whether the record demonstrates proper consideration of all environmental issues. This full environmental review is particularly appropriate here, where an area Congress has deemed worthy of special preservation is involved. The decision we reach reflects this independent examination we have made of the record.

It was contended before the Licensing Board that direct harm to the Lakeshore environment would be caused by a number of factors. Chief among these were that: (1) lowering the ground water table during construction would concomitantly lower the water level of bogs and ponds in the National Lakeshore, permanently damaging the delicate ecological systems in those unique wetlands; (2) operation of the facility's cooling tower will emit a water vapor plume that would (a) merge with chemical emissions from nearby industrial smokestacks to form an "acid mist" deleterious to Lakeshore biota, (b) deposit salt residues that will further injure the Lakeshore biota as well as pollute Lake Michigan and (c) worsen weather conditions in the area; (3) operations of the nuclear facility would pollute Lake Michigan with undesirable (including radioactive) waste materials; (4) use of ash ponds now on the Bailly property in conjunction with the new facility would pollute the National Lakeshore into which they assertedly drain; (5) intake of additional cooling water for the nuclear facility would destroy substantial quantities of fish in the Lake; and (6) the cooling tower would constitute a "visual intrusion" looming unattractively over the natural horizons of the Lakeshore.

The Licensing Board's decision reviews each of these environmental contentions, sets forth in detail its reasons for rejecting or accepting them, and

[30] RAI-74-4, 600-01 (paragraph 133).

[31] RAI-74-4, 625 (paragraph 198).

[32] Intervenors filed a total of 501 exceptions, the larger portion of which they did not brief.

[33] Actually, intervenors' brief in support of its exceptions does not attack any of the Licensing Board's environmental findings. That brief does, however, "incorporate by reference" memoranda intervenors filed with us in support of their earlier motion for a stay of construction pending appeal. Those memoranda question the conclusions that lowering the water table, referred to as "site dewatering", will not injure the Lakeshore.

documents each finding with references to relevant portions of the record. RAI-74-4, Part III, pp. 586-613. Our independent review of the record, including all evidence bearing on possible adverse effects from the construction or operation of the Bailly facility, confirms that the Board's resolution of the environmental issues accurately reflects the weight of the evidence for the reasons cogently stated in the cited portion of its decision. We do not think we could materially improve on that exposition and therefore simply note our full concurrence.

In agreeing, as we do, with the Licensing Board that the construction and operation of the Bailly nuclear facility will not have significant (if any) direct environmental impact on the Indiana Dunes National Lakeshore, we are not unmindful that Assistant Secretary of the Interior Nathaniel Reed testified to his Department's opposition to the issuance of the construction permit. The Assistant Secretary candidly admitted that his familiarity with the Indiana Dunes National Lakeshore was limited to a single 2½ hour visit made the day prior to his testimony; aside from that one occasion, he had never been near the National Lakeshore. (Tr. 7558.) Mr. Reed also stated that he had not read the Environmental Impact Statement on the Bailly facility, having seen only "a synopsis" of portions of it, and that he was unfamiliar with most of the testimony received in the proceeding. (Tr. 7596-97.) Not unexpectedly, his testimony was imprecise about adverse effects which the Bailly facility might engender on the Lakeshore, and was not bolstered by personal knowledge or study of the area or its ecological systems. No special weight accrued to the Assistant Secretary's environmental testimony in these circumstances. The Licensing Board therefore quite properly based its environmental findings on more persuasive evidence from other sources.

Aside from his generalized unhappiness over the facility's proximity to the Lakeshore, Mr. Reed expressed two other principal concerns. The first was that the "low population zone" surrounding the plant, which included some 640 acres in the National Lakeshore, would interfere with Interior Department's management of the area (Tr. 7566-68). The second was that, as seen from the parkland, the cooling tower would be an "objectionable visual intrusion" (in less formal language, an "eyesore"). (Tr. 7563.) (Mr. Reed agreed that the presence of the tower on the applicant's property in and of itself would not interfere with his agency's management of the Lakeshore. *Ibid.*)

Mr. Reed's apprehensions about the effect of the low population zone are apparently the product of a misconception about what is meant by that term. Briefly, it is Commission policy to take into account population concentrations in passing judgment upon the suitability of particular locations for the siting of nuclear plants. The purpose behind the policy is simply to ensure a low risk of public exposure in the event of any accident, however unlikely. See 10 C.F.R. Part 100 (1974 rev.). The term "low population zone" is but a shorthand expression in Part 100 to describe one relevant factor in evaluating whether a

given location meets the Commission's standards. See *Consumers Power Company* (Midland Plant, Units 1 and 2), ALAB-123, RAI-73-5, 331, 341-42 (May 18, 1973). From the standpoint of neighboring property owners, public or private, the creation of a "low population zone" does not impose—and is not meant to impose—restrictions on the use of land within the perimeters of the zone. Concern that the Bailly low population zone might impinge on the Interior Department's management prerogatives in the Indiana Dunes National Lakeshore is thus a *non sequitur*. It is therefore not surprising to find that Interior has no "official policy" respecting low population zones (Tr. 7544-45), there manifestly being no reason to develop one.[34] (In a more relevant vein, we note that the Assistant Secretary voiced no objection to the Bailly facility from the standpoint of health and safety. (Tr. 7597, 7608.))

As for the aesthetic nature of the cooling tower, the Licensing Board agreed with Mr. Reed's characterization of its appearance as seen from the Lakeshore. For the reasons we discuss below, the Board correctly declined to view this factor to preclude as a matter of law or fact the issuance of a construction permit to the applicant.

3. **Indiana Dunes National Lakeshore Act.** The Licensing Board found negligible (if any) possibility that the Bailly Nuclear facility would disturb the Indiana Dunes National Lakeshore environment. It held accordingly that the act authorizing the Lakeshore[35] did not preclude construction of the Bailly facility on applicant's property even though its cooling tower would be visible from the Lakeshore's western reaches. That decision rests both on the terms of the Lakeshore Act and on its legislative history. The Board noted that the act gives the Secretary of the Interior authority to control the use of privately owned land only within the Lakeshore's mapped boundaries, and it read the legislative history as confirming a congressional purpose not to interfere with or otherwise limit industrial expansion on property outside those boundaries. RAI-74-4 at 626-27.

The National Lakeshore is administered by the Interior Department and was established with the Department's support. We therefore expressly invited the Secretary of the Interior to file a brief *amicus curiae* with us, "outlining his

[34] To be sure, were there any accident at Bailly, it might be necessary to evacuate visitors from the National Lakeshore as from other surrounding areas. This remote contingency was not what was bothering the Assistant Secretary. He readily acknowledged that the Lakeshore superintendent as a matter of course prepares contingency plans to evacuate visitors in case of other emergencies (*i.e.*, floods, tornadoes). Expanding these emergency plans to cover this additional situation is merely "a local matter" to be worked out by the Lakeshore administration, who, he assured, would cooperate in this respect. (Tr. 7585-86.)

[35] 16 U.S.C. § §460u *et seq.* (1970).

Department's position in light of the full record of the proceeding and setting forth his views respecting the effect of the Indiana Dunes National Lakeshore Act (16 U.S.C. §460u *et seq.*) on the construction permit application here involved." RAI-74-4 at 484. Although acknowledged, our invitation was not acted upon and no *amicus* brief is before us. While Assistant Secretary Reed testified before the Licensing Board, he was not a lawyer and did not address himself to the legal effects, if any, of the Lakeshore Act on the private holders of adjacent industrial properties.

We think that the Licensing Board was sensitive to the intendment of the Indiana Dunes National Lakeshore Act and that the Board's decision correctly reflects the congressional purposes underlying the legislation. The unique features of the Indiana Dunes and wetlands have long been recognized by conservation-minded individuals.[36] Nevertheless, over the years responsible public officials have reacted cautiously to proposals to reserve the area for recreational and scientific purposes exclusively. They did so not from lack of appreciation of the special duneland environment, but out of strongly held views that the people of northern Indiana would be better served by industrial development in the area. Respected Indiana representatives reiterated in congressional hearings and debates their belief, right or wrong, that creation of new industry and new jobs took priority over establishment of new parks on the Indiana shores of Lake Michigan.[37] For this reason those in favor of the National Lakeshore had to overcome the opposition of legislators preferring a new Indiana industrial lakeport, to be known as Burns Harbor, in this same general area.[38] The proponents of the harbor and the supporters of the lakeshore ultimately reached a compromise. The Indiana Dunes National Lakeshore Act was one part, the other was an authorization of federal funding

[36] See, e.g., *Report on the Proposed Sand Dunes National Park* by Stephen T. Mather, National Park Service Director, to Interior Secretary Lane. (G.P.O. 1917).

[37] See, *e.g.*, Testimony of Congressman Madden in *Hearings Before the Subcommittee on Rivers and Harbors, et al., of the House Committee on Public Works, on Burns Waterway, etc.*, 89th Cong., 1st Sess. (1965), Part II at pp. 637-38 (1965); See also the remarks of Congressman Halleck of Indiana, 112 *Cong. Rec.* 25068 (October 11, 1966); remarks of Congressman Roush, *id.* at 26108.

[38] For example, in rebuttal to Indiana Representative Halleck's unfavorable comments, Congressman Saylor (floor manager for the Lakeshore bill) argued (112 *Cong. Rec.* 26112):

Simply stated, the controversy which surrounds this legislation involves two separate pieces of legislation proposed for the State of Indiana—a deepwater public port and the Indiana Dunes National Lakeshore. Advocates of each project have for many years embarked on a collision course without obtaining authorization for either project.

In 1963 the administration sought to resolve this conflict and officially endorse both projects for the State of Indiana. In the spring of 1965 the Indiana General Assembly passed legislation authorizing $25 million to start construction of the public port.

(Footnote 38 continued)

for the Burns Harbor development west of the Lakeshore near the Bailly site.[39] Even strong congressional supporters of the Lakeshore agreed that its authorizing legislation "would not in any way be an impediment to industrial growth on privately held land beyond the Lakeshore boundaries.[40]

(Footnote 38 continued)

In October of 1965 this Congress enacted Public Law 89-298, the 1965 omnibus rivers and harbors bill, which contained a $5 million reimbursement for that part of the port which the Federal Government would usually construct. However, the conference committee in reporting the 1965 omnibus rivers and harbors bill inserted a proviso, as follows:

No appropriation is authorized to be made for the construction of this project until the Indiana Dunes National Lakeshore has been voted upon by both Houses of Congress during the same Congress.

• • •

There are those who will argue that this legislation will stifle the economic and industrial development of northern Indiana. That argument has no merit so far as I am concerned with regard to this legislation.

This bill recognizes the economic and industrial growth of northern Indiana and seeks to preserve for those who are engaged in such economic and industrial pursuits an area in which to enjoy the pleasure of recreation close at hand during their leisure time.

I firmly believe that the establishment of this Indiana Dunes Lakeshore will provide a balanced development for northern Indiana.

[39] The congressional committee reports on the Lakeshore Act bear this out. For example, S. Rep. No. 334, 89th Cong., 1st Sess. (1965) states at page 4 that "the committee recognizes the need for space for industrial growth as testified by many persons who appeared at the public hearings in opposition to the establishment of any facility. It does feel, however that . . . in the bill a reasonable compromise has been reached." This comports with the views of Administration supporters of the bill, who advised the committee that the "Bureau of the Budget regards both the Burns Harbor and the Indiana Dunes National Lakeshore proposals as integral elements for a balanced development of the area, and legislation providing for such development would be in accord with the program of the President." (*Id.* at p. 9.)

[40] This is perhaps most clearly expressed in the dialogue on the Senate floor between Senator Hartke of Indiana and Senator Jackson, Chairman of the Senate committee sponsoring S.360, the bill to establish the Lakeshore which was ultimately enacted (112 *Cong. Rec.* 27366):

Mr. HARTKE: Mr. President, for purposes of clarification, one thing should be made quite clear, although there is no argument about it, reference has been made to the proposed port in this general area. There is nothing in the proposal which would in any way be an impediment to the rational development of that port and also the utility of Federal funds in that area.

Mr. JACKSON. The Senator is absolutely correct. There is nothing in the bill that will interfere with that development.

Mr. HARTKE. In other words, there can be Federal Government participation in the park and in the port at one and the same time—walking side by side, so to speak?

Mr. JACKSON. The Senator is correct.

Mr. HARTKE. The fact is, then, that this development will provide a great opportunity both to have jobs and recreation at the same time.

(Footnote 40 continued)

In light of this legislative history, we think the Licensing Board's understanding of the Lakeshore Act was the correct one. The act in so many words limits the Secretary of the Interior to acquiring land and easements only "within the boundaries of the Lakeshore." 16 U.S.C. §460u-1.[41] Those boundaries were not left to the Secretary to adjust but were literally mapped by Congress itself. 16 U.S.C. §460u.[42] In contrast, where Congress has intended to place restrictions on surrounding properties to insure extra protection to the lands inside a park, it has so provided in unmistakable terms. For example, the Redwood National Park Act[43] permits the Secretary of the Interior, to assure "the preservation of the scenery within the boundaries of the national park," to modify the park boundaries within certain limits, 16 U.S.C. §79b(a), and to acquire easements over lands "on the periphery of the park" if deemed necessary for its protection. 16 U.S.C. §79c(e).[44] Similar discretion has been granted to the Secretary by Congress in connection with other parks.[45]

In sum, there is no dispute that the site for the Bailly facility is on applicant's property and beyond the Lakeshore boundaries fixed by Congress. That its cooling tower will be visible from the Lakeshore is also admitted. But this is equally true of the 250 foot smokestacks and other existing industrial structures among which that tower will stand. We think the congressional compromise, under which the Indiana Dunes National Lakeshore was authorized with the understanding that it would develop "side by side" with industry in this area of Indiana, precludes our interpreting the Lakeshore Act to prohibit industrial structures on private property solely because they are visible from

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(Footnote 40 continued)

Mr. JACKSON. That is the advantage of the pending measure. It will, indeed, make possible at long last the development of a great new lakeshore and at the same time help meet the industrial needs and requirements of the great State of Indiana. The Senator can be proud of the pending measure.

[41] This restriction on the Secretary's authority appears in other sections of the act also. See 16 U.S.C. §§460u-2, u-3, and u-4(b), (e).

[42] In pertinent part that provision provides that the Indiana Dunes National Lakeshore "shall comprise the area within the boundaries delineated on a map identified as 'A proposed Indiana Dunes National Lakeshore,' dated September 1966, and bearing the number 'LNPNE-1008-10', which map is on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior." A pending measure to increase the amount authorized to be expended to acquire property within the bounds of the Lakeshore from private owners indicates no intent to modify that situation. See S.584, 93rd Cong., 1st Sess., and S. Rep. No. 93-591, 93rd Cong., 1st Sess. (December 3, 1973).

[43] 16 U.S.C. §§79a *et seq.* (1970).

[44] See *Sierra Club* v. *Department of Interior*, 376 F. Supp. 90 (N.D. Cal. 1974).

[45] *E.g.*, Voyageurs National Park, 16 U.S.C. §160 *et seq.* (Suppl. I 1971). See 16 U.S.C. §160a authorizing the Secretary to "revise the boundaries of the park from time to time" but not to exceed 1000 acres in total.

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inside the Lakeshore.[46] To hold otherwise would be to trench on that legislative judgment; this we may not do.[47]

4. **Alternatives to the Bailly facility.** Under the National Environmental Policy Act, before approval to the proposed nuclear facility may be granted consideration must be given to "alternatives to the proposed action"[48]. In other words, the Final Environmental Statement prepared in connection with the project must discuss, and the agency must consider, "alternative ways of accomplishing the objectives of the proposed action."[49] In this case, intervenors say insufficient consideration was accorded to placing the nuclear facility at some location other than the Bailly site.[50] We do not agree.

(a) There can be no argument that a nuclear power generating facility needs substantial quantities of cooling water for its operation. The record indicates that three sites along the shores of Lake Michigan and a number of riverside sites in applicant's northern Indiana service area were carefully explored as possible locations for the facility. The Bailly site was picked as the best of the Lakeshore sites; this conclusion is well supported in the record.[51] The inland sites reviewed included possible locations on the banks of the Tippecanoe, Wabash, Maumee, St. Joseph and Kankakee Rivers. Ultimately a point along the Kankakee near Dunns Bridge, known as the Schahfer site, was selected as the best of those riverside locations. Intervenors' witness agreed. (Tr. 8091.)

The advantages and disadvantages of all the sites were detailed and explained in the Final Environmental Statement prepared by the staff. See Staff Exhibit 5,

[46] The fact that the Lakeshore is bounded by an industrial area which now contains, *inter alia*, substantial smokestacks which are clearly visible from within the Lakeshore equally bars our rejection of the Licensing Board's conclusion that the NEPA cost-benefit balance was not tipped against the facility by reason of the cooling tower.

[47] Our opinion assumes that the Secretary may take measures open to any other landowner (or in some other statute we may have overlooked) to protect the Lakeshore against tortious injury. We hold only that neither those laws cited to us, nor any that our research has uncovered bars the issuance of a construction permit to the applicant under the Atomic Energy Act.

[48] 42 U.S.C. §4332(C) (iii) (1970).

[49] Explanation of the quoted provision, given to the Senate by the sponsor of the legislation and Chairman of the Senate Interior Committee, which reported the bill 115 *Cong. Rec.* 40420 (December 20, 1969).

[50] Intervenors' brief (p. 17) chastizes the Board for failing to consider "alternatives in general" as well as alternate sites. Both because intervenors make no effort to indicate what alternatives other than different sites were overlooked and because in fact many alternatives were considered (see RAI-74-4 at 620-23), we limit our discussions to the siting issue.

[51] See, *e.g.*, Bohn and Criner, pp. E-38-10 and -11, follows Tr. 4708; App. Exh. 9, p. Q22-1, Tr. 4849-51, 4919-20; Staff Exh. 5, p. XI-6, Geckler, pp. 3-4, follows Tr. 6291. Intervenors' own witness, R. Read, rejected at least the Gary lakeshore site as inferior to Bailly. (Tr. 8090.)

part XI. The Statement then further compared the best Lakeshore site, Bailly, with the choicest riverside location, Schahfer (*ibid.*)

The Final Environmental Statement as originally submitted correctly noted that applicant was undertaking construction of a coal-fired generating station at the Schahfer site (*id.* at p. XI-7). Nevertheless, it inexplicably treated that site as totally undeveloped in comparing the costs of placing a nuclear facility at that riverside location with the same expenses at the Bailly site. (*Id.* at XI-10, -13). Its conclusion that the Bailly site was preferable rested, at least to some extent, on that incorrect cost comparison, although it also listed other reasons. (*Ibid.*) The Licensing Board caught the discrepancy during the course of the proceeding. The Board quite properly directed the staff to reconsider its comparison of the Bailly and Schahfer sites, correctly pointing out that a number of the alleged disadvantages of the latter (the need for new transmission lines, for example) should be eliminated because they involved costs that would be incurred for the fossil plant in any event. RAI-74-4 at 624.

A new study was made as directed (Staff Exhibit 8) and those who prepared it were subjected to thorough cross-examination (Tr. 6940-95). The restudy concluded in substance that the Bailly site was still more advantageous than Schahfer on environmental considerations but only slightly so. (Tr. 6982-84.) The Schahfer site's principal disadvantage is the limited availability of water in the Kankakee River, particularly during the summer months.[52] With the addition of the nuclear facility at the Schahfer site, the plant's cooling system would entrain about one quarter of the river's flow (and consequently about one quarter of the microbiota in the Kankakee) during the summer low-water period (Tr. 6954-55). Virtually all those organisms, already weakened by the river's higher water temperature during summer, would be killed by exposure to the additional heat during the entrainment process. (Tr. 6955.) This would substantially affect the ecology of the Kankakee in the Schahfer vicinity because the river's natural resources would not replace such sizeable losses of biota within a reasonable time (Staff Exh. 8; Tr. 6955-56; 6962-63). In contrast, entrainment caused by operation of the nuclear facility at the Bailly site on Lake Michigan would destroy only an insignificant portion of the organisms in the Lake, and those would be quickly and naturally regenerated (Tr. 6953).

Furthermore, the cooling tower operations return water to the source of supply (the lake or the river as the case may be) with increased salt concentrations. This would have minimal effect on Lake Michigan because of its size. The Kankakee, however, is both smaller and more saline than the Lake. A cooling tower using river water thus would substantially affect the salinity of the Kankakee River, another environmental disadvantage of the Schahfer site (Tr. 6948-50).

[52] Staff Exh. 5, p. XI-7; Bohn and Criner, p. E-38-29, follows Tr. 4708; Tr. 6953-54.

An additional environmental advantage to the Bailly site involves the thermal effect of the nuclear unit's cooling water plume on the fish. At the Bailly site, heat from the nuclear unit's cooling water would make up only a small portion of the total heat discharged into the Lake because of the sizeable heat discharges from the existing fossil-fired generating units at that site. Consequently, when the nuclear facility is shut down (as it must be on occasion), the shut-down will have a negligible effect on the water temperature in the plume area at the Bailly site. This means there would be little, if any, danger of a potentially deadly "thermal shock" to fish in such events. (Tr. 6968.) At the Schahfer site, however, if the heat discharge from the nuclear unit is added to that of the one coal-fired generating unit under construction there, the nuclear unit's cooling water plume would constitute the larger portion of the total thermal discharge into the Kankakee. Consequently, were a nuclear unit at Schahfer shut down, it would measurably lower the temperature of the river water with a greater risk of "thermal shock" to fish in the plume area. (Staff. Exh. 8; Tr. 6957; 6969-71.)

The Licensing Board agreed with the conclusion reached in the restudy that Bailly remained slightly more advantageous even on environmental considerations alone, and found no environmental advantage to be achieved by using the Schahfer site instead of the Bailly site for the facility. (RAI-74-4 at 624-25.) Under the Commission's NEPA regulations (10 C.F.R. Part 50, App. D., §A.11(1974 rev.)), this action effected a modification of the Final Environmental Statement, and the Board's decision was submitted to the Council on Environmental Quality and made publicly available. See 39 *F.R.* 16403 (May 8, 1974).

(b) Intervenors attack the Final Environmental Statement as modified by the Licensing Board on several grounds. They principally contend that the statement should have considered sites for the proposed facility outside the applicant's service area, that the statement improperly gave detailed site consideration to the "best alternatives" only, and that the Board improperly relied on the substantial delay and increased costs involved in moving the facility from the Bailly to the Schahfer site as a reason for not favoring the latter. Those contentions are not well-founded.

To begin with, the NEPA requirement to discuss alternatives to a proposed course of action presupposes that the alternatives be reasonable. *Natural Resources Defense Council, Inc.* v. *Morton,* 458 F.2d 827, 836 (D.C. Cir. 1972); remote and speculative possibilities need not be considered. *Life of the Land* v. *Brinegar,* 485 F.2d 460, 472 (9th Cir. 1973), certiorari denied,___ U.S.___, 40 L.Ed. 2d 312 (April 22, 1974). Accord, *Daly* v. *Volpe,*___F. Supp.___, 6 ERC 1826, 1831 (W. D. Wash. 1974); *City of North Miami* v. *Train,*___F. Supp.___, 6 ERC 1841, 1845 (S. D. Fla. 1974).

Aside from passing, unexplained references, intervenors' papers give no indication of which sites outside applicant's service area they believe should have been studied. Neither do those pages contain any exposition or supporting

explanation why those distant locations would be superior to the Bailly or Schahfer sites, which are within applicant's service area. Moreover, selection of any distant site implicitly carries a commitment to allow extended use of long distance transmission lines to bring the power generated there to applicant's customers. Neither the staff nor the Board were required to blink the fact that long distance high voltage lines and towers are not only expensive, but themselves notoriously unwelcome "visual intrusions" in the environment.[53] There may well be occasions when the search for an acceptable nuclear plant site must go far outside a utility's service area, particularly in heavily populated regions. Here, however, the record confirms the existence of acceptable sites closer at hand. To choose a far distant site for the nuclear facility would necessitate transmission towers marching for miles across countryside they do not serve. We think that disrupting other peoples' backyards in this manner to protect intervenors' environment is not a "reasonable alternative." It was properly rejected.

(c) Nor can we find fault with the procedure used to evaluate the potential sites. There is no serious dissent in the record from the finding that Bailly was the location of choice if the facility was to be on the Lakeshore. As we noted above (p. 265), intervenors' own witness agreed (and there was much other supporting evidence) that the Schahfer site on the Kankakee River was the best of the inland locations. Indeed, intervenors' briefs do not even suggest some other specific inland site as superior. NEPA does not require the discussion of alternatives to meet some "unbending standard"; its requirements are satisfied where the discussion allows consideration of a reasonable choice of alternatives. *City of North Miami* v. *Train, supra.* Here, after being given careful and reasoned consideration, the less desirable locations were eliminated and a final comparison made between the two best alternative sites for the nuclear facility, Bailly and Schahfer. This seems to us an eminently sound approach in the context of this case. We note that a NEPA review of alternatives conducted along similar lines has received judicial sanction. See *Fayetteville Area Chamber of Commerce* v. *Volpe,*___F. Supp.___, 6 ERC 1891, 1894 (E.D. N.C. 1974).

Intervenors' position appears to be that the type of cost-benefit comparison that was performed between the Bailly and Schahfer sites should also have been performed for every other potential site, including several unspecified locations. Nothing in NEPA requires such a wasteful, reiterative process. The very District of Columbia Circuit case cited by intervenors establishes "that the discussion of environmental effects of alternatives need not be exhaustive. What is required is

[53] See, *Greene County Planning Board* v. *Federal Power Com'n,* 455 F.2d 412, 420 (2nd Cir.), certiorari denied, 409 U.S. 849 (1972), and *Scenic Hudson Preservation Conf.* v. *Federal Power Com'n,* 354 F.2d 608, 616 (2nd Cir. 1965), for judicial observations about the adverse environmental effects attributable to transmission lines.

information sufficient to permit a reasoned choice of alternatives so far as environmental aspects are concerned." *Natural Resources Defense Council, Inc.* v. *Morton, Supra,* 458 F.2d at 836.[54] The review of alternative sites in this proceeding satisfied that requirement. As the Ninth Circuit recently cautioned when faced with similar arguments, NEPA "should not be employed as a crutch for chronic faultfinding." *Life of the Land* v. *Brinegar, supra,* 485 F.2d at 472.

(d) Finally, intervenors argue that the Licensing Board's preference for the Bailly site over Schahfer turns on the delay and increased costs which would be entailed in shifting the facility to that inland site at this date. Such matters, they say, are improper considerations under NEPA, relying on the paragraph quoted from the *Calvert Cliffs'* decision set out in the margin below.[55]

Intervenors use the *Calvert Cliffs'* quotation out of context. It formed part of the court of appeals' discussion of this agency's obligation to consider environmental issues in passing on applications to build and operate nuclear facilities. The factors mentioned by the court, *i.e.*, "economic costs," and "delay," are not sufficient bases for a failure to evaluate such considerations in deciding whether such applications may be granted. That evaluation was of course made in this case. The quoted phrase, however, was not directed to whether economic expenses involved in undertaking an alternative course of action should be included in assessing its costs and benefits. To the extent such an issue was considered in Calvert Cliffs', the decision does not require that such costs be ignored, but given their appropriate weight in that balancing process. See 449 F.2d at 1115.

Moreover, there is another leg to the Licensing Board's decision which also fully justifies the result it reached. The Board found that, even with the so-called

[54] In *Scientists' Institute for Public Information, Inc.* v. *A.E.C.* the D.C. Circuit reiterated "that [NEPA] admits of some degree of flexibility and agency discretion in determining the contents of impact statements. The range of actions covered by NEPA, as we have seen, is exceedingly broad, ranging from, for example, construction of a particular segment of interstate highway to embarkation upon a broad development program of nationwide significance such as the LMFBR program. The issues, format, length and detail of impact statements for actions as diverse as these must of course differ. NEPA is not a paper tiger, but neither is it a strait jacket. Drafting a proper impact statement involves much more than filling in the blanks on a government form. NEPA statements can and do vary, from relatively short and simple analyses of the environmental effects of smaller projects to complex multivolume works for projects of multi-billion-dollar dimensions." 481 F.2d 1079, 1091-92 (1973).

[55] "Thus the Section 102 duties [under NEPA] are not inherently flexible. They must be complied with to the fullest extent, unless there is a clear conflict of *statutory* authority. Considerations of administrative difficulty, delay or economic cost will not suffice to strip the section of its fundamental importance." *Calvert Cliffs' Coord. Comm.* v. *U.S. A.E.C., supra,* 449 F.2d at 1115 (D.C. Cir. 1971). (Emphasis in original, footnote omitted.)

delay costs put to one side, "there are no cumulative, significant environmental advantages in the alternative sites." RAI-74-4 at 625. We concur for the reasons discussed at pp. 265-268. We therefore hold that NEPA's requirements for consideration of alternatives were satisfied and reject intervenors' contentions to the contrary.

5. **Need for power.** Intervenors' final argument challenges the Licensing Board's findings on applicant's need for the power to be generated by the Bailly facility. (RAI-74-4 at 615-20.) They claim that "the Board manipulated internal capacity, purchased power and load projections to arrive at a percent reserve which was interpreted to show an alleged need for [Bailly Generating Station] Nuclear-1 in 1979." Despite the wide-ranging attack on the Board's calculations and projections, which consumes some 43 pages of their brief, intervenors' argument is a narrow one. The issue is not applicant's need for additional generating capacity *vel non;* intervenors concede that even under their own calculations applicants must have more generating capacity by 1980. (The Bailly facility, if approved, is estimated to be completed and ready for operation in the period March 1, 1978 to September 1, 1979.)[56] Rather, intervenors' calculations are simply designed to support their argument that, even if shifting the nuclear unit to the Schahfer site would delay its completion by several years, applicant could utilize coal-fired generating plants planned for future construction to make up the loss of Bailly's generating capacity during the transfer period.

We need not reach the merits of intervenors' claims regarding the Board's need for power calculations and prediction to reject that argument. As we have already discussed at some length (*supra,* pp. 265 *ff.*), no appreciable environmental benefit inheres in relocating the proposed facility at the Schahfer site. To the contrary, our review confirms that the balance of environmental factors alone falls against the Schahfer site and in favor of the proposed location. We think the environment would be harmed, not served, in these circumstances by prolonging applicant's total dependence on generating facilities fired by fossil fuels in short supply.

6. **Uranium fuel cycle.** Subsequent to the decision below, the Commission completed a rulemaking proceeding which investigated the environmental consequences of mining, manufacturing, using and disposing of uranium fuel of

[56] Hiple, p. E-39-21, follows Tr. 4345. Intervenors' witness H. Read testified that even under his calculations of the need for power NIPSCO would require some additional generating capacity by 1980 (Tr. 7228), and intervenors candidly admitted in their brief that the Board's calculations "actually showed" a need for some generating capacity in 1979 or 1980 beyond that which would be provided by existing facilities or those currently under construction (brief, p. 34).

the type to be utilized in the proposed Bailly facility. Based on information gathered at that proceeding, the Commission quantified the adverse environmental effects of such a fuel cycle and assigned numerical values, representing a proportionate share of those adverse consequences, to be factored into each pending licensing proceeding. See 39 *F.R.* 14188 (April 22, 1974).[57] Where, as here, an initial decision has already been rendered by the Licensing Board, it becomes our obligation under the new regulation to insure that those factors are properly considered in the cost/benefit balance. See *Potomac Electric Power Company* (Douglas Point Nuclear Generating Station, Units 1 and 2), ALAB-218, RAI-74-7, 79 (July 15, 1974). See also *Philadelphia Electric Company* (Peach Bottom Atomic Power Station, Units 2 and 3) CLI-74-32, RAI-74-8, 217 (August 8, 1974). In this case, as we have just mentioned, the basic issue is not *whether* there should be a nuclear facility but *where* it should go. Obviously, whichever site is chosen, the environmental consequences of the uranium fuel cycle would remain relatively unchanged because the same type of facility is being considered for all locations. The effects of that cycle, therefore, cannot tilt the cost/benefit balance between the sites under consideration in this case, for the same approximate values would go onto both sides of the scale. We may therefore limit our consideration of that issue to noting that fact. See *Peach Bottom, supra*, RAI-74-8 at 220.

III. INTERVENORS' MOTION FOR A STAY PENDING APPEAL

We initially declined to enter an order staying all construction of the Bailly nuclear facility until we decided the appeal. We did, however, direct the applicant not to undertake construction work at the site before September 1, 1974 which might lower ground water levels in the Indiana Dunes National Lakeshore. We did not take this step because intervenors had demonstrated that irreparable injury to the Lakeshore would follow without it. Rather, we did so in light of the applicant's candid representation that it would be in no position to start the construction phase which intervenors alleged might affect the water table in the Lakeshore before September 1st in any event. See RAI-74-5 at 822. Our order instituting that "limited stay" also established a schedule for briefing and argument that left us sufficient time to decide the case on the merits by that date.[58]

[57] The regulation is now published as 10 C.F.R. §51.20(e), 39 *F.R.* at 26282 (July 18, 1974).

[58] See ALAB-200, RAI-74-4, 483 (April 30, 1974), and ALAB-201, RAI-74-5, 821 (May 3, 1974).

As a precaution against a decision unfavorable to their position, intervenors moved on August 15, 1974 to have us continue the "limited stay" in effect pending judicial review of our determination. Both the regulatory staff and the applicant oppose that motion, the latter pointing out that extending the "limited stay" will in fact halt construction of the nuclear facility entirely because it precludes completion of its foundations.

To begin with, it is not the case in administrative proceedings, any more than it is in judicial ones, that a losing party is automatically entitled to a stay of the decision below while it seeks further review in the court of appeals. *Permian Basin Area Rate Cases*, 390 U.S. 747, 773 (1968) (Harlan, J.). On the contrary, an application for a stay—in the circumstances presented here the equivalent of a preliminary injunction—is a request for extraordinary relief; the party seeking it must show that (1) there is a substantial likelihood of its prevailing on the merits of its appeal; (2) without such relief it will be irreparably injured; (3) if a stay is granted, the possibility of substantial harm to other parties does not outweigh the threatened injury to the movant, and (4) grant of the stay is consistent with the public interest. *Permian Basin Area Rate Cases, supra; Virginia Petroleum Jobbers Ass'n* v. *Federal Power Comm.*, 259 F.2d 921, 925 (D.C. Cir. 1958); *Eastern Air Lines* v. *Civil Aeronautics Board*, 261 F.2d 830 (2nd Cir. 1958); *Associated Securities Corp.* v. *Securities & Exch. Comm.*, 283 F.2d 773 (10th Cir. 1960). See also *Sampson* v. *Murray*, 415 U.S. 61, 84 and fn. 53 (1974). These prerequisites for the equitable relief intervenors seek have not been altered by the National Environmental Policy Act. *Canal Authority of State of Florida* v. *Callaway*, 489 F.2d 567, 578 (5th Cir. 1974), and cases there cited. The motion for a stay, therefore, requires us to exercise our discretion on the basis of the facts of the case. *Permian Basin Area Rate Cases, supra*, 390 U.S. at 773. In accordance with our established practice, we test that motion against the judicially established standards just outlined.[59]

1. **Likelihood of success on appeal.** Intervenors filed their stay motion in advance of our decision for the reasons earlier noted. By so doing, they effectively precluded themselves from addressing whether, and on what ground, our action in this case is likely to be overturned on judicial review. Given this posture of the matter, we simply pass the question with the observation that, as is manifest from the preceding portions of this opinion, we view intervenors' possibilities of success on further appeal as problematical.

[59] See *e.g.*, *Trustees of Columbia University*, ALAB-62, WASH-1218 (Suppl. 1) 464 (July 28, 1972); *Boston Edison Company* (Pilgrim Nuclear Power Station), ALAB-81, WASH-1218 (Suppl. 1) 546 (November 15, 1972); *Philadelphia Electric Company* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-158, RAI-73-11, 999 (November 7, 1973); and ALAB-221, RAI-74-7, 95 (July 31, 1974).

2. **Irreparable injury.** It is "the established rule that a party is not ordinarily granted a stay of an administrative order without an appropriate showing of irreparable injury." *Permian Basin Area Rate Cases, supra,* 390 U.S. at 773. Joint Intervenors point to only one possibility of irreparable damage should our order precluding applicant from undertaking certain "site dewatering" activities be permitted to expire as scheduled on September 1, 1974. This is the contingency that those construction activities might lower the ground water table in the National Lakeshore and by so doing, irreparably disturb the ecological systems in its bogs and ponds.

In support of their assertions, intervenors point to the same evidence on which they relied when arguing for a stay of construction pending our own decision (motion, p. 2). Intervenors say that "nothing has occurred to avoid the possibility of irreparable injury to the National Lakeshore if the Applicant is allowed to begin construction of the proposed nuclear plant at the Bailly site" (motion, p. 11), and that, therefore, there is no reason why the stay should not be continued while they seek judicial review of our decision in the court of appeals.

We cannot agree, for circumstances have changed, and changed significantly. First, the applicant's site preparation work has progressed to a point where it is expected that excavation for the facility will reach the "ground water level by October 1, 1974, at which time dewatering would begin."[60] Thus, continuation of the "limited stay" beyond that date can no longer be justified on applicant's forbearance.

Second, we no longer view intervenors' factual assertions against the background of an unfamiliar 11,000-page record and hundreds of unreviewed exhibits. We have now examined that record carefully and have measured intervenors' claims against the full evidence. As discussed in Part II above, our conclusion is that the record amply supports the determination below that the construction of the facility will not occasion any significant environmental harm to the National Lakeshore. While we need not go beyond that conclusion, nevertheless we briefly examine intervenors' principal claims of irreparable injury.

Intervenors' arguments rest on their witnesses' testimony purporting to demonstrate that lowering the groundwater as necessary to dig the foundations for the Bailly facility will concomitantly lower the groundwater table in the Lakeshore. This, intervenors' witnesses testified, would damage the ecological systems in Lakeshore ponds, particularly in Cowles Bog, a National Natural Landmark inside the National Lakeshore. As the Licensing Board's decision makes clear, intervenors' reliance on that testimony ignores substantial and more convincing evidence to the contrary. First, the testimony of numerous other

[60] Bohn affidavit, dated August 23, 1974, attached to applicant's reply of even date to intervenors' motion to continue the stay.

well-qualified witnesses was that the effects of "dewatering" at the Bailly construction site—which is on the far side of applicant's property and removed from the Lakeshore by several hundred yards—will not extend into the Lakeshore to any significant degree. Second, the testimony of intervenors' witnesses was based on inaccurate assumptions about the depth of the proposed dewatering and the extent of its lateral effects. We have reviewed the evidence on this question and fully concur in the Board's conclusions for rejecting the evidence of intervenors' witnesses. See RAI-74-4 at 589-90.

Furthermore, most of the feared consequences of dewatering listed by intervenors, particularly those expressed in the testimony quoted in intervenors' motion papers, relate to potential effects on Cowles Bog. But Cowles Bog is not coterminous with the National Lakeshore, nor does it lie at the Lakeshore's western extremity. Intervenors' own exhibit places that bog over a mile from the Bailly construction site.[61] Another map in evidence shows the bog to be even further away, placing its nearest boundary nearly a mile-and-a-quarter from the construction site.[62] As the Licensing Board found, no effect from dewatering would be felt at that distance. The evidence it cited fully supports that finding. (*Ibid.*) In short, the intervenors' witnesses may be entirely correct about the consequences of lowering the water table under Cowles' Bog. We find no evidence in the record, however, and intervenors point to none, which indicates that Cowles Bog is likely to be affected at all from construction of the Bailly facility, much less injured irreparably. The burden, as we noted, was on intervenors to demonstrate that there will be irreparable harm done to the Lakeshore while the Bailly facility is under construction. (This is the only allegation of injury they make in support of their stay motion.) We find that they simply have not carried that burden.

3. **Injury to applicant.** As with the question of likelihood of success on appeal, intervenors have not addressed the issue (although we note that their papers cite *Virginia Petroleum Jobbers,* which makes this a key factor for consideration before a stay may be granted). While the present stay is limited in terms to precluding certain "dewatering" activities at the Bailly site, the effect of a continuation of this stay would be far greater. In fact, its continuance would halt construction of the facility entirely, because the groundwater at the site must be lowered to put in the foundations. Applicant's motion papers estimate the costs of construction delay (after October 1, 1974) to aggregate

[61] See map preceding Tr. 7951, appended to the prepared testimony of Dr. Baskin.

[62] See map preceding Tr. 4216, appended to prepared testimony of Mr. Criner on contention 31.

more than $82,000 per day[63]; the staff's exhibits suggest a higher daily figure of $93,000 (Staff Exh. 8-8-D). Intervenors do not challenge those figures and we may accept them as sufficiently accurate for purposes of this motion. Even though we are generally experienced with the applicable law and facts involved in licensing cases under the Atomic Energy Act, nearly five months have elapsed between the Licensing Board's initial decision and our affirmance. We think it fair to estimate that, given the size of the record, normal review procedures in a court of appeals will require roughly the same period. Were a judicial decision to be forthcoming by the end of the year (which we think the absolute minimum to be anticipated), the delay cost to applicant (or, more realistically, to its customers) would exceed $7,000,000. And this is a conservative estimate which disregards the effects of inflation. There can thus be little doubt that a stay pending completion of judicial review will result in a substantial financial expense to applicant and those whom it serves.

4. **The public interest.** Finally but not least importantly, we think the public interest would be ill-served by a stay. As our opinion indicates, there is little room for doubt that applicant's customers will need the electrical energy to be produced by the Bailly facility. Delaying completion of the nuclear plant will not only be costly, but may engender the possibility of reduced or interrupted electrical service in the area.[64] And even if its absence could be made up by other facilities, doing so would be at the expense of burning vast quantities of coal, oil and gas, fossil fuels already in short supply. When these factors are weighed against the minimal, indeed negligible, likelihood of disturbing the ecological systems of the National Lakeshore bogs and ponds, we think no other conclusion can fairly be reached than that the stay requested is not in the public interest. We so hold.

Stay pending application to the court of appeals. Intervenors have requested that we continue the so-called limited stay pending completion of judicial review; this we have declined to do for the reasons stated. Although we are confident of the correctness of that decision, it is not inconceivable that a court of appeals may disagree. Applicant has expressly represented to us that it will not undertake the construction activities at the Bailly facility which intervenors

[63] See Bohn and Cringe, E-38-31 through E-38-37, following Tr. 4708.
[64] See Tr. 10,182-83.

claim might affect groundwater levels in the National Lakeshore prior to October 1, 1974. This will provide intervenors more than adequate time to attempt to convince a court that we have erred in denying a further stay beyond that date. We see no need, however, to enter a formal order extending the stay to October 1st. Applicant has fully abided by its representations in the past; we have every confidence that it will similarly honor this commitment.

IV. CONCLUSION

Intervenors' exceptions are denied. In accordance with our practice, we have examined those portions of the initial decision to which no exceptions were taken or which, though excepted to, were not supported by timely-filed briefs. We find no error that would invalidate the Licensing Board's conclusion that the issuance of a construction permit to the applicant was merited. To the contrary, we find that the Board made a full, fair and accurate evaluation of the evidence and reached a conclusion fully warranted by the record before it. The initial decision is accordingly *affirmed* and, for the reasons set forth in Part III of this opinion, intervenors' motion to continue the "limited stay" beyond September 1, 1974 is *denied.*

It is so ORDERED.

FOR THE ATOMIC SAFETY AND
LICENSING APPEAL BOARD

Margaret E. DuFlo
Secretary to the Appeal Board